FLIGHT
The AIRCRAFT ENGINEER AND AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 1233. (Vol. XXIV. No. 33.) AUGUST 12, 1932 **Weekly, Price 6d. Post Free, 7½d. Abroad, 8d.**

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2.
Telephone: (2 lines), Holborn 3211 and 1884.
Telegrams: Truditur, Westcent, London.

Subscription Rates, Post Free.

United Kingdom	s.	d.	United States		Other Countries	s.	d.
3 Months ...	8	3	3 Months ...	$2·20	3 Months ...	8	9
6 ,, ...	16	6	6 ,, ...	$4·40	6 ,, ...	17	6
12 ,, ...	33	0	12 ,, ...	$8·75	12 ,, ...	35	0

CONTENTS

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

Aug. 11-28. International Touring Competition, Berlin.
Aug. 13. Opening of Ganton Aerodrome.
Aug. 14. Irish Ae.C. Aerial Picnic, at Athy, Co. Kildare.
Aug. 14-27. National Aviation Day Displays (See p. 768).
Aug. 15-16. Cricket: R.N. *v.* R.A.F. at Lords.
Aug. 19-21. 4th Annual Canadian Air Pageant, St. Hubert, Quebec.
Aug. 20. Ryde Air Pageant.
Aug. 22-27. Plymouth Air Week.
Aug. 25. Folkestone Aero Trophy Race.
Aug. 28. Close of International Touring Competition, Berlin.
Sept. 3. Leicester Chamber of Commerce Day, at Desford.
Sept. 4. Divine Service at Ratcliffe Aerodrome, 2.30 p.m.
Sept. 5. F.A.I. Conference at The Hague.
Sept. 8. International Meeting, Vicenza, Italy.
Sept. 17. S. African Air Rally, Rand Aerodrome, Germiston.
Sept. 24. Hillmans' Air Display at Maylands Aerodrome, Brentwood.
Sept. 24. No. 45 Sqdn. R.A.F. Reunion Dinner, at Overseas League Club House, Park Place, S.W.1.
Sept. 25. Gordon Bennett Balloon Race, Basle.
Oct. 1. Bristol and Wessex Ae.C. Garden Party.
Oct. 18. Aero Golfing Society: Cellon Challenge Cup, West Hill G.C.
Nov. 18-Dec. 4. Paris Aero Show.

EDITORIAL COMMENT

JULY and August are the months when the training of the Auxiliary Air Force squadrons reaches its final and most intensive stage. Some of them have played their part in the Royal Air Force Display; others have taken a share in the Air Exercises. Now, when the regular squadrons have come to the leave season and many of the Service aerodromes are practically vacant, the Auxiliary squadrons go into camp on those aerodromes, and carry out a fortnight of real hard work. That is not to say that they do not work hard during the rest of the year. Every week-end, whenever the weather is suitable for flying, the pilots spend every available minute in the air. When the weather is too bad for flying, there is plenty of ground work to be done. It is a commonplace to say that efficiency in the air depends upon the soundness of the preparations on the ground, but the maxim can hardly be repeated too often. Officers and airmen have to study hard on the ground before they can attain real efficiency in all the manifold activities which are required of a squadron which is to be of use to its country in an emergency. Apart from actual flying and keeping formation, officers and airmen between them must provide experts in navigation, gunnery, bomb aiming, photography, wireless and other subjects which to the man on the ground seem very learned and recondite. They are spurred on in their labours, not only by a genuine love of the work, but also by the competition for the Esher Trophy. This trophy is given to the most efficient squadron of each year, and the competition for it occupies a large part of the training year. It is no question of one "mad minute." One squadron is examined in photography one week, another in wireless another week, and so on. In fact, the staff of No. 1 Air Defence Group is kept quite busy visiting the various squadrons, lecturing to them and examining them. Sometimes it happens that the visiting officers have to instruct or examine men who are themselves experts in the subject of the lecture. The A.A.F. can boast not a few private owners who have flown their own

The Auxiliary Air Force

machines far and wide, and have given practical proof that they have not much to learn about navigation. Others are in private life experts on instruments. In fact there is a wealth of talent to be found in the various ranks of the A.A.F.

Last week we wrote in our leading article that flying is now becoming what archery once was, the popular sport of the day. Now, as in olden days, men train themselves to defend their country by following their favourite sport. The man who becomes an officer in an Auxiliary squadron gladly gives up the whole of his week-ends, and most of his summer evenings to work on the aerodromes. He thinks of lawn tennis and golf as frivolities of his unregenerate days, and probably finds his best chance of indulging in such recreations during the fortnight in camp, when work usually stops soon after midday. One is almost inclined to wonder if the officers get enough time to devote to physical fitness, for it is essential that a pilot must be fit, and flying does not do for the body what a game of Rugby football will do. In the regulars great stress is rightly laid on playing games, but, then, the regular officers have no outside work to attend to in the intervals of doing their flying work. However it is managed, there is no doubt that the officers of every A.A.F. squadron with which we are acquainted look very fit men.

If the officers of the A.A.F. are quite surprisingly good at their voluntary tasks, the airmen are positively amazing. The applications for enlistment are always plentiful, and most of the squadrons could double their strength at very short notice. Very wisely, however, they will only take men of the most suitable class, and these men, once they have been admitted to the squadron, put their backs into their work in a way which compels the most intense admiration. Some squadrons get many men from the mechanical trades, while others get mostly clerks, shopmen, etc. Very seldom does it happen that any airman selects to work in the squadron at the sort of task at which he works professionally. The motor mechanic will decline to be an engine fitter, and will perhaps take up photography with enthusiasm. The men all pass their trade tests and become experts. All of them are expected to be able to handle a Lewis gun, for whether the back cockpit is occupied by a bomb-aimer, or photographer, or wireless operator, if the machine is attacked by an enemy, he must be able to use his gun in defence of the tail. This work in the air is extremely popular with the airmen, and is a great incentive to recruiting. It is almost invariable for every squadron to go to camp with every auxiliary airman who can possibly get leave to attend. For most of them it is their annual holiday, and they are only too pleased to spend it in camp working very hard. Every endeavour is made to see that the day's work stops at noon, so that the men shall have the afternoons for recreation. Where it is possible, arrangements are made for their wives and families to spend the holiday in the neighbourhood of the aerodrome, for if they could never share the holiday of the husband and father, there might be in time a fear of the woman's vote taking the form of a veto on joining the A.A.F. In spite of all, there are times when urgent work has to be done on a machine or engine, and then fitters or riggers are always found who will cheerfully keep on at the work so as to get the machine serviceable by the time it is needed. In fact, the spirit of the men is excellent. It is not too much to say that, though this country has throughout its history a remarkable record of public work carried out by unpaid volunteers, such as the old Militia, the Volunteers and Territorials, the Justices of the Peace, and until quite lately the Members of Parliament, no voluntary effort has ever achieved greater efficiency than has the Auxiliary Air Force.

The results of all this effort have been very noticeable this year. At the Hendon Display the three squadrons which are recruited in the London area worked together as a bomber Wing, and their formation flying when they represented the initials "A A F" was a very much admired incident. In July the two squadrons from Scotland, No. 602 (City of Glasgow) and No. 603 (City of Edinburgh) B.S., formed part of the bombing force of Southland which for four days without intermission carried out raids on the targets in Northland. These squadrons found their way to their targets with the same certainty as the regular squadrons, and when they were attacked by the fighters, the umpires awarded their due share of victories to the gunners in the "Wapitis." That was most strenuous work, and as the Scots were flying over country which was probably quite unfamiliar to most of the pilots, the accuracy of the navigation was especially creditable.

Finally we have had last week the great concentration of six squadrons, Cadre and Auxiliary, at Manston at a few hours' notice. Large concentrations usually require considerable preparation. In this case the staff of No. 1 Air Defence Group made a minimum of fuss. The four outlying squadrons were simply told to arrive at Manston and land at given times, and each carried out the orders so far as the weather made it possible. What might have been made a complicated operation (for six bomber squadrons make a formidable force) was made to appear the simplest thing in the world. It was a very impressive demonstration, and was only possible because of the high state of efficient organisation at which each of the squadrons has arrived.

There are various ways of achieving efficiency. In some squadrons the pilots call the C.O. by his Christian name ; in others they straighten their backs when he speaks to them and call him "Sir." In either case the net result is well-kept machines and engines, good flying, and undoubted *esprit de corps*. Either method produces a very happy family in mess. One fairly recent development is undoubtedly good. The squadrons are learning to rely less and less upon the adjutant and the nucleus of regular airmen. The regular element is undoubtedly necessary, and it has to be a very carefully selected element if things are to go well. But each flight commander now manages his own flight in practically all details, and the airmen are proud to undertake the care and maintenance of the machines and engines in each flight, without calling for regular assistance at every turn. This relieves the adjutant of a great deal of work which he once had perforce to do himself. The adjutant, however, is also proud to be a very busy man. The time now at his disposal is given to flying instruction. He is a qualified instructor, and now he also takes a course at Wittering in instrument flying. The newly joined officers are taught to fly by him from the very beginning, while the more experienced ones are taught advanced flying under the canvas hood. The cost of the Auxiliary Air Force is the cheapest insurance premium which the British Government has ever paid.

VIEW OF STOCKHOLM FROM THE TOWER OF THE TOWN HALL.

Ni skall bli nöjd!*

By IVOR McCLURE

I HAVE just put my Carnet away in a drawer, and in doing so I found a very old one dated July 23, 1927. It expired on the following August 27. I remember that with that Carnet I went to France, Spain, Italy, Austria and Hungary. On looking inside I find each page in its virgin purity, uninscribed, unstamped and untorn. Things have changed since then. Carnets are now valid for twelve months, and they do not go far without being burdened with the elaborate seals and signatures of the Customs authorities of the nations through which you pass. The whole procedure, though perhaps a trifle elaborate, is not a very great nuisance, but I look back with regret to the days before we had truck with the Customs.

A more subtle change has come over foreign touring by air. I can remember very distinctly the excitement with which, five years ago, we made long, careful and very expensive preparations for our European flight. Many hours were spent selecting the maps on which we thought it would be best to fly. How often we were wrong in our choice! For over a fortnight we cut and gummed these together and mounted them on cards. With the aid of that wonderful publication, now extinct, the Luftverkehrs Atlas, we plotted the position of the aerodromes and worked out our tracks and distances. We had a Mark II "Moth" without extra tanks, and we were hampered by a rather limited range.

We took with us money in the currency of each nation that we proposed to visit so as to be able to pay for our petrol and oil without having to go into the town to change sterling. We carried a funnel and chamois leather and used it often. We took with us a spare can of Vacuum oil, as it was sometimes impossible to get anything but castor on the aerodrome. In those days Vacuum was the only mineral oil that you could be certain of getting throughout Europe, and I have not yet found the smallest village where a sealed can of this product could not be obtained. The memory that now seems stranger than any is that on so many aerodromes ours was the first "Moth" to land.

Nowadays it is otherwise. Few air routes have been travelled by more British aircraft than the one to Vienna and Buda-Pesth. It is embarked upon at almost a day's notice. While the Customs officer at Heston is stamping your papers you may step into the flight office next door and hire all your flying maps on which almost every conceivable fact of importance that can affect your safety or convenience is clearly marked. You can get your petrol or your oil without paying cash by using the carnets provided by the petrol companies. And you set off with the satisfactory knowledge that countless others have safely and enjoyably completed the flight before you.

Some speak with regret of the good old days when Continental touring by air was an adventure. Adventure is a luxury that we cannot always afford, for it implies the possibility of disaster. Flying is no longer a sport, as it is so often regarded abroad, but has become a means of transport. The object of a flight is to reach a destination with the least possible tedium and delay. In making an application for a permit to fly over a certain country, I once wrote those words against the query: "Object of Flight?" The form was returned to me. I then wrote: "Pleasure." When I landed in the country I was placed under arrest for three days.

There still remains in Europe one of the pleasantest flights that it is possible to make, and which is in no way hackneyed and where the conditions savour of the good old days. If anybody wishes to try it they can do so with every prospect of enjoyment until the middle of September, when the climate is no longer at its best. I can strongly recommend it.

There have been mariners' tales about the horrors of a flight to Stockholm with a land machine. With a seaplane nothing could be easier, but to fly over miles of forest and water, devoid of any but the sketchiest aerodromes at long intervals, has been held to be folly. I have just been to look for myself, and I know that the mariners' tales are fit only for the marines.

The adventuresome may be disappointed during the first part of the journey, for this is over the most efficiently serviced air route in the world. Everyone who has landed at Schiphol, the airport of Amsterdam, knows full well the amazing courtesy and efficiency that is always to be met with there. There is the "Petrol King," who has always such a cheery greeting for visitors, and who takes your aeroplane away from you to fill it up while you have lunch in the aerodrome restaurant. The meteorological officer can explain in fluent English full details of the weather into which you are flying. Before you leave you have merely to collect your log-book and carnet, which were taken from you when you landed, and which have been stamped in the meantime.

Your next stop is Hamburg, where you will possibly choose to spend the night. As you taxi up to the tarmac you will see one of the smart aerodrome police leave the office of the *flugwache* and pedal towards you on his

* You will be satisfied!

bicycle. To him you will hand over your papers, which you have only to collect before your departure. The electric benzine tanks come rumbling up to refuel your machine. It is, perhaps, rather a long walk to the meteorological office at the far end of the vast aerodrome building, but you will find there a rich assortment of weather charts and willing helpers to explain anything that you may want to know. And then you can go up to the *haupt-restaurant* on the floor above.

If you prefer to make your night stop at Copenhagen, you can be away from Hamburg in less than half an hour, a very marked contrast to the hours that had to be spent in the good old days. The flight to Kastrup, the airport of Copenhagen, is a pleasant one, for although there is water to cross, the hops from land to land are short ones. It is unimaginable that anyone could lose their way.

Kastrup is a pleasant aerodrome, where English is well spoken and where the officials do everything that they can to be helpful. It is regrettable that the aerodrome charges are so much higher than elsewhere. It is well worth spending a little time in Copenhagen, which is a city of considerable beauty. You should see the recently completed copper and glass building that is called Vesterport. You should have dinner at the Ritz, which is on the top floor. The tables are placed in a verandah along two sides of the vast building, and there is a fine view over the city. It is amusing to stand in the street at night and see this great building almost in darkness. Along the top floor there is a row of cylindrical lights; that is the restaurant. The lift, which is almost entirely of glass, runs in a shaft behind a window that stretches from the pavement to the roof. As the lift is brilliantly lit you can see all the guests being taken up to their food. Next to the lift is the staircase, which is also behind a long window, so that if anybody walks up you can see them, too. You should not fail to see the police station, but the visit should be voluntary. It is one of the most interesting buildings in Europe. Lastly, there is nearly always a good circus going on every evening.

Fifteen minutes' flight over the island of Saltholm brings you to Malmö. At the airport the manager of the Swedish company, A.B. Aero Transport, makes you welcome in good English. At Kastrup, the meteorological officer is able to give you in English weather reports from seven stations along the air route to Stockholm, but you can obtain this all over again at Malmö, if you wish. There is a tiresome Customs regulation in Sweden which makes it necessary for you to have a permit to fly your aeroplane in that country. This permit can only be had at Malmö, and takes a day to obtain. The inconvenience of this is mitigated in practice, for you are allowed to proceed without the permit, which can be posted on to you or, indeed, it can await your return to Malmö. I never saw mine at all, but I had to pay 16s. for it, which was dear for the fun that I got out of it. The carnet was no use, as in the good old days.

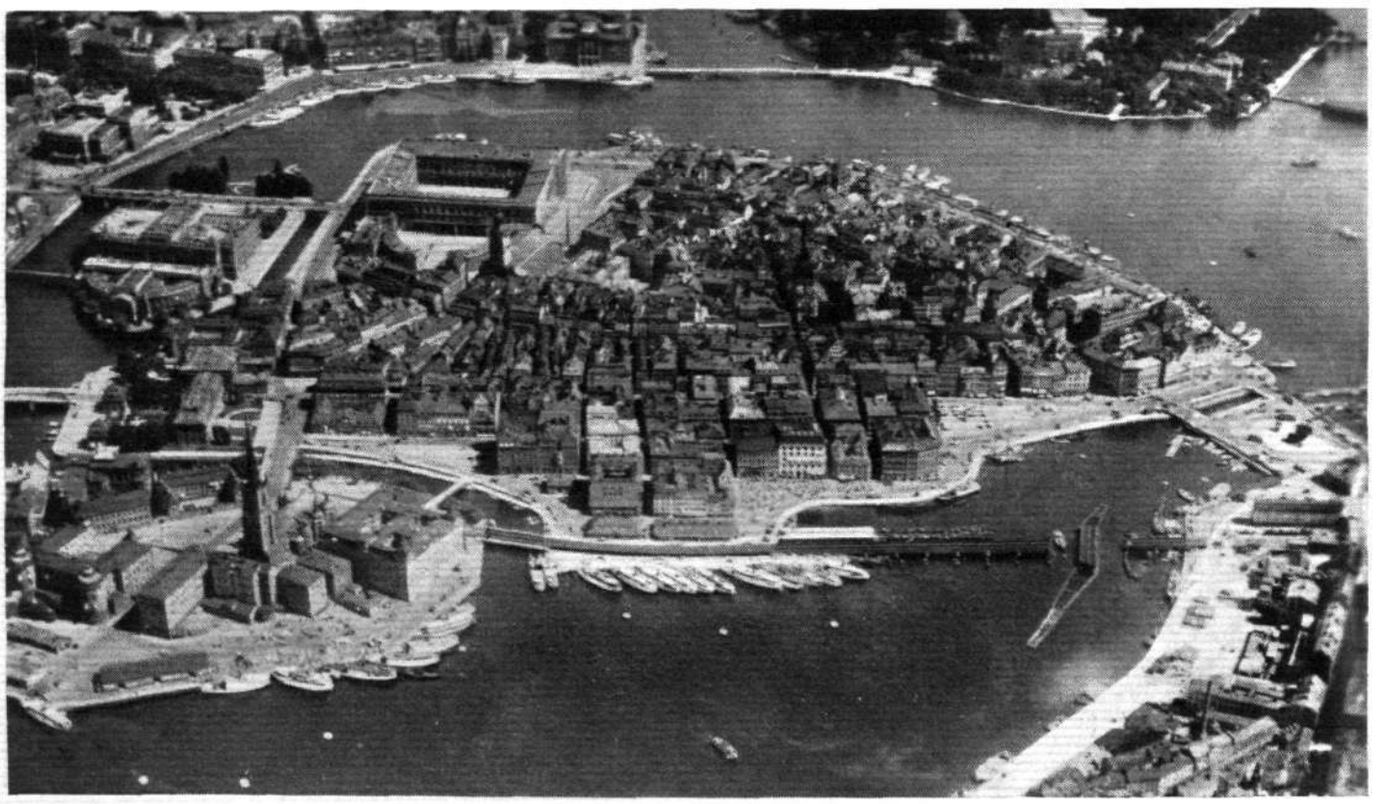
Then begins the adventure. At Kastrup they are not encouraging about the nature of the flight that you propose to make, and they tell you gloomy stories of the aerodrome at Barkarby, which is the nearest to Stockholm. At Malmö, too, they are not complimentary about it, and suggest that you should fly round it several times before landing. I can honestly say that first soloists have been sent off worse sites in England.

You may have misgivings about your map, which shows almost as much forest as it does lakes, and very little else. The map is quite good and accurate, and, provided that you make up your mind to ignore all the smaller lakes and check your course by the larger ones you will have no difficulty. There are many small farms and their fields, many of which have been under hay, would permit a safe forced landing, provided care was used. Two dangers are the numerous power cables and the outcrops of rock that occur in some of the fields. Along the route there are hardly more than three sections, of some ten to fifteen miles in length, where it would be disastrous if the engine were to cut dead. This could be said of many routes.

Within about fifty miles of Malmö you will begin to notice the smell of Sweden, the wonderful scent of the forests that follows you up even to six thousand feet. It invades the very streets of Stockholm. If you have flown between Bordeaux and Biarritz on a hot sunny day, you have had a taste of it ; Sweden is even better than that.

It is certainly advisable to have an accurate knowledge of the position of the three intermediate aerodromes on the route, two of which are excellent. If the wind makes it impossible to cover the odd three hundred miles without refuelling, it is as well to know at which aerodrome to land if you want quick service and not an hour and a-half's delay. This information should be on every good flying map. All the aerodromes are occupied solely by the military, as there is no civil flying, but many of the mechanics speak good English and all are very helpful, calm and efficient.

Barkarby aerodrome need not worry you if there is a good schedule of it on your map. The chief trouble about this place is that there is no hangar accommodation for



AN AERIAL VIEW OF STOCKHOLM : The Royal Palace in the middle background, the Riksdags building on the left, and the Riddarholms Church in the left foreground.

visiting aircraft, and if the city of Stockholm would go to the small expense of erecting a shed for visiting aircraft it would be a great convenience until such time as the proposed new civil airport is completed. It is necessary to take pickets and covers, but the ground allotted for parking is well protected by surrounding woods from any strong winds that might spring up. Pickets hold well in the soil. There are no landing or parking fees at any of the military aerodromes.

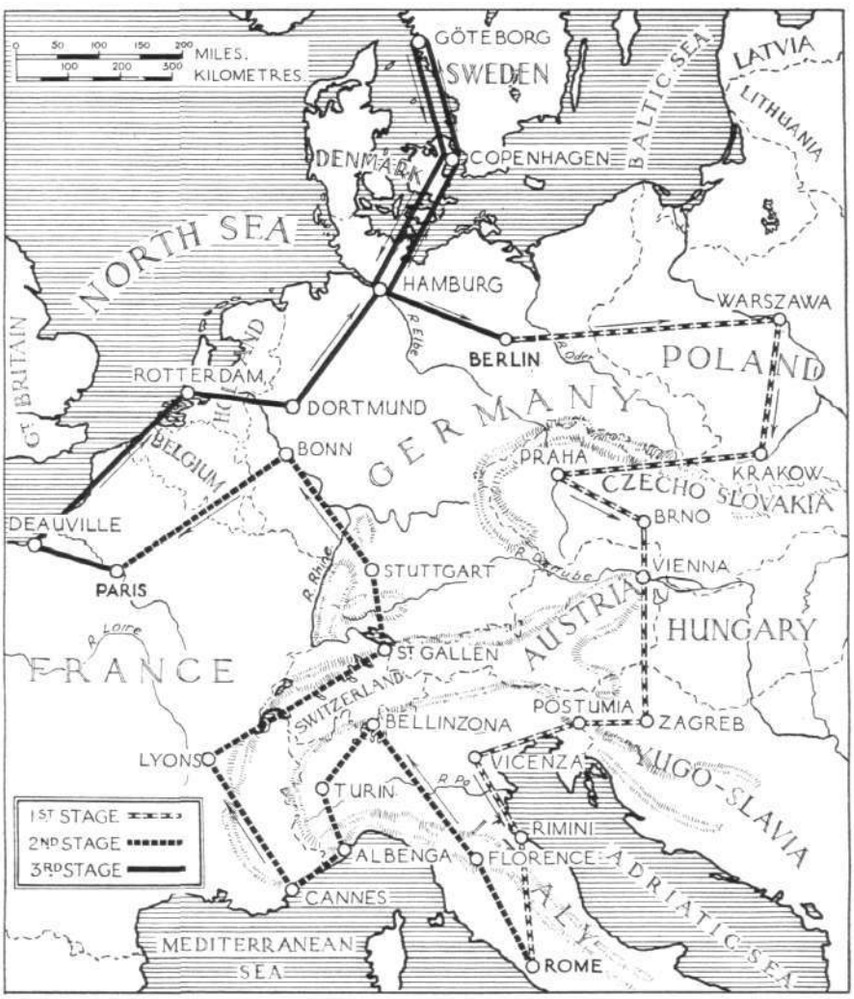
A bent and slightly rusty taxi can be obtained at short notice, but the Automobile Association has arranged with the Motormännens Riksförbund and the Swedish Motor Club for members to be met at the aerodrome if the time of their arrival is telegraphed in advance. It is a long but beautiful ride into town.

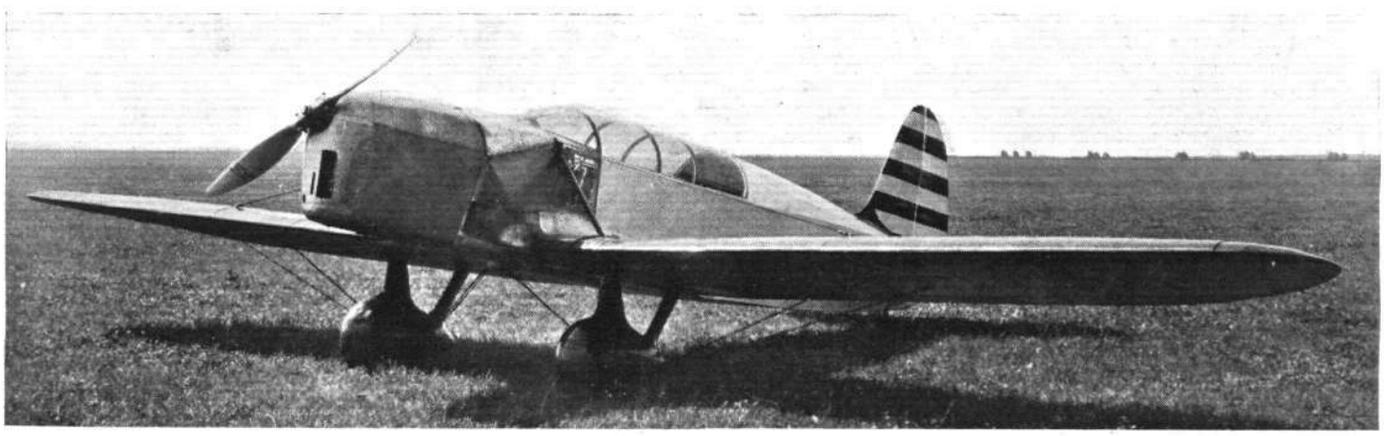
Stockholm is one of the wonders of Europe for beauty, cleanliness, comfort, and all that's nice. It does not need describing here. I would like to mention Strömsborg. It is an island occupied by a picturesque restaurant at which you should dine on a fine evening at a table in the open. You will have no difficulty in coping with a menu in a strange language nor doubts that possibly you are missing some of the greatest delicacies that are obtainable anywhere. The service is supervised by a very charming lady indeed who speaks the most delightful English. Her name is Astrid Signeul. Place yourself unreservedly in her hands, and if you are grateful to me for the advice, have the kindness to give her my sincerest compliments.

If you go to Copenhagen, De vil blive tilfreds; if you go to Stockholm, ni skall bli nöjd. It seems a shame to mention it, but these are hard times. Sweden is one of the few places where, when you change a pound sterling, you get value for your money.

THE CIRCUIT OF EUROPE

IN connection with the International Touring Competition, which started yesterday in Berlin, a circuit of Europe is being flown. This is divided into three stages, two clear flying days being available for each stage. The stages are: Berlin-Rome, Rome-Paris and Paris-Berlin. The various town visited on each stage are shown on our map. The circuit of Europe starts on August 21, Rome will be reached in the afternoon of August 22, Paris in the afternoon of August 24, and the finish at Berlin will take place during August 27. There is a "day of rest" in Paris on August 25. The total distance is approximately 4,450 miles.





FOR THE INTERNATIONAL TOURING COMPETITION: Built by Ceskomoravska-Kolben-Danek of Prague, and designed by Messrs. Benesh & Hain, who years ago used to design the Avia machines, the Praga B.H.111 is fitted with a de Havilland "Gipsy III" engine. The machine is credited with a speed of 143 m.p.h. and is a two-seater with "conservatory" cabin. The ply-covered wing is wire braced.

PRIVATE FLYING & GLIDING

ON THE STARTING LINE : Mr. Reynolds has his red flag up in readiness to send off Miss Fidelia Crossley in her Comper " Swift " (Pobjoy " R "). (FLIGHT *Photo.*)

THE LONDON-NEWCASTLE RACE

Eighteen machines faced the starter (Mr. A. G. Reynolds) at Brooklands Aerodrome last Saturday for the race from London (Brooklands) to Newcastle (Cramlington). Lt. Col. L. A. Strange was limit man in a Spartan " Arrow " (" Gipsy II "), and Flt. Lt. Fielden, the Prince of Wales' pilot, was scratch in the Comper " Swift " (" Gipsy III "), which Fielden flew to second place in the King's Cup Race some time ago. In between the two were a comprehensive assortment of types, such as " Moths," " Avians," " Pobjoy-Swifts," " Puss Moths," an Arrow " Active," a Blackburn B.2 Trainer, a Segrave " Meteor " and an " Autogiro."

The start from Brooklands was without incident, except that Mr. Gairdner accidentally stopped his engine just before the start and lost nearly a minute before he got it going again and got away. The wind was westerly, fairly strong, and visibility was reported good over the greater part of the course, deteriorating slightly towards Newcastle. The course was a straight-line one except for a slight detour to Sherburn, which was a turning point. The total distance was 264 miles. A last-minute wind correction was put in by the handicappers (Rowarth and Dancy), and worked very well, the race finishing, as regards the first three machines, some five minutes before the estimated time. How excellent the handicapping was is shown by the fact that the first ten machines arrived inside a period of five minutes.

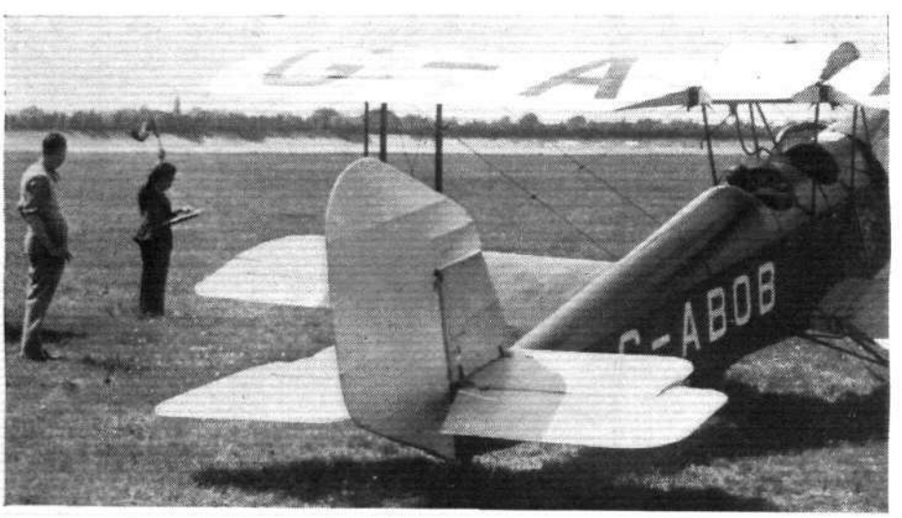
The London-Newcastle race was won by the Hon. R. Westenra, who was flying a de Havilland " Moth " fitted with " Gipsy II " engine. His time was 2 hr. 13 min. 13 sec., and his average speed over the 264 miles was 118¾ m.p.h.

To have averaged a speed of more than 118 m.p.h. over the course is very good for a " Moth," and points to good navigation (by the aid of Smith's instruments) no less than to good running on the part of the " Gipsy II " engine, which ran on Pratts spirit and Castrol oil. The winner's engine, like those of Runciman, Maxwell and Fielden, used K.L.G. plugs, and these were fired by B.T.H. magnetos.

Mr. W. L. Runciman was second in his " Puss Moth " G-ABLG (" Gipsy III "), the same which he flew to third place in the King's Cup Race. His net time was 1 hr. 57 min. 59 sec., and his average speed 134¼ m.p.h., which compares with a speed of 130 m.p.h. over the King's Cup Course.

Third place was gained by Capt. I. C. Maxwell, Managing Director of Pobjoy Airmotors, Ltd., who was flying a Comper " Swift " (" Pobjoy R "). Capt. Maxwell's time was 2 hr. 2 min. 30 sec., corresponding to an average speed of 129¼ m.p.h. In the King's Cup Race the same machine, piloted by Mr. Lowdell, averaged 124¾ m.p.h.

The prize for the fastest time went to Flt. Lt. Fielden, the scratch man, who averaged the astoundingly high speed of 162¼ m.p.h. In the King's Cup Race Fielden, on the same machine, averaged 155¾ m.p.h. Styran, on the



THE LIMIT MAN GETS AWAY : Lt. Col. Strange ready to " give her the gun " when Mr. Reynolds shall drop his red flag. On the right, Mr. W. L. Runciman getting into his " Puss Moth " in which he gained second place at a speed of 134.25 m.p.h. (FLIGHT *Photos.*)

WINNER AND FASTEST TIME: On the left, the "Gipsy Moth" in which the Hon. R. Westenra gained first place at a speed of 118.75 m.p.h. On the right, Flt. Lt. Fielden in his Comper "Swift" ("Gipsy III") awaits the signal to go. He put up the fastest time in the race, with a speed of no less than 162.25 m.p.h. (FLIGHT *Photos.*)

BROOKLANDS-CRAMLINGTON RACE—AUGUST 6, 1932. 264 MILES.

Place	Reg'n Mk.	Aircraft	Engine	Start	Finish	Net Time	Aver. Speed	Pilot
1st	JL	Moth	Gipsy II	12.46.03	14.59.16	2.13.13	118¾	Westenra.
2	LG	Puss Moth	Gipsy III	13.02.41	15.00.40	1.57.59	134¼	Runciman.
3	TC	Swift	Pobjoy R	12.58.47	15.01.17	2.02.30	129¼	Maxwell.
4	TR	Spartan II	Hermes IIB	12.40.21	15.01.34	2.21.13	112¼	Thorn.
5	WW	Swift	Gipsy III	13.24.45	15.02.21	1.37.36	162¼	Fielden.
6	HE	Avian IV	Cirrus III	12.28.10	15.02.47	2.34.37	102½	Kennard.
7	IX	Active I	Hermes IIB	13.07.40	15.03.05	1.55.25	137¼	Healy.
8	ZC	Swift	Pobjoy R	12.58.17	15.03.06	2.04.49	126¾	Walker.
9	ZR	Moth	Gipsy I	12.39.41	15.03.30	2.23.49	110	Bailey.
10	JR	Swift	Pobjoy R	12.58.47	15.04.16	2.05.29	126¼	Mayers.
11	UA	Swift	Pobjoy R	12.57.46	15.05.24	2.07.38	124	Miss Crossley.
12	WI	B2 Trainer	Gipsy III	12.45.26	15.06.10	2.20.44	112½	Woodhead.
13	OB	Arrow	Gipsy II	12.25.00	15.12.15	2.47.15	94¾	Strange.
14	FP	Meteor	2 Gipsy III	13.08.02	15.13.28	2.05.26	126¼	Armour.
*	WH	Swift	Gipsy III	13.22.48	15.03.04	1.40.16	158	Styran.
*	LM	Autogiro C24	Gipsy III	12.47.16	15.20.21	2.33.05	103½	Brie.
*	WA	Puss Moth	Gipsy III	13.00.46	15.20.34	2.19.48	113¼	Gairdner.
—	JZ	Moth	Gipsy I	12.39.41	—	—	—	Tangye.

* Failed to cross finishing line correctly.

CRAMLINGTON AIR RACE. 3 Laps. Total 25 miles.

HEAT I.

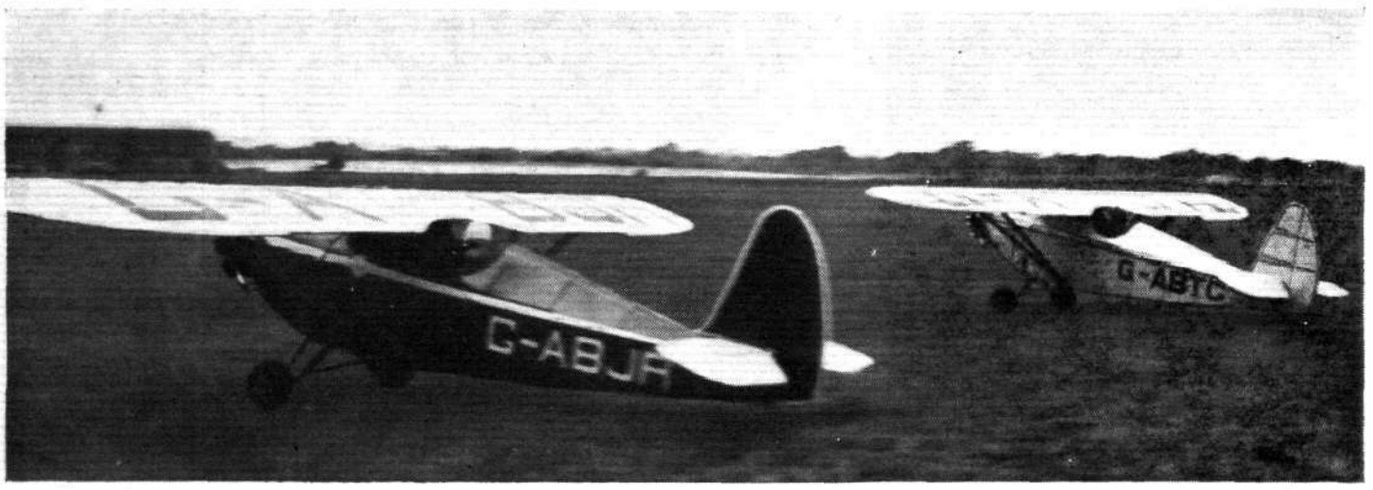
Reg. Mk.	Pilot	Aircraft	Engine	Start	Finish	Net Time	Av. Speed	Place
				m. s.	m. s.	m. s.	m.p.h.	
UZ	Donald	Moth X	Cirrus II	0 00	18 06	18 06	82¾	4th.
JS	Rushton	Moth	Gipsy I	0 48	17 28	16 40	90	2nd.
RD	Duffie	Moth	Gipsy I	0 53	16 22	15 29	97	1st.
DA	Caldwell	Moth	Gipsy I	1 31	17 29	15 58	94	3rd.
WA	Gairdner	Puss Moth	Gipsy III	3 57	retired.	—	—	—

HEAT II.

OB	Strange	Arrow	Gipsy II	0 00	17 41	17 41	84¾	3rd.
RX	Miss Leathart	Moth	Cirrus III	1 03	16 52	15 49	94¾	1st.
TR	Thorn	Spartan II	Hermes IIB	1 44	17 44	16 00	93¾	4th.
ZC	Walker	Swift	Pobjoy R	3 41	—	—	—	—
JR	Mayers	Swift	Pobjoy R	3 44	—	—	—	—
IX	Leech	Active I	Hermes IIB	4 37	17 15	12 38	118¾	2nd.
FP	Armour	Meteor	2 Gipsy III	4 48	17 54	13 06	114½	5th.
WH	Styran	Swift	Gipsy III	6 17	19 48	13 31	111	6th.

FINAL.

UZ	Donald	Moth X	Cirrus II	0 00	18 04	18 04	83	8th.
OB	Strange	Arrow	Gipsy II	0 00	17 01	17 01	88¼	5th.
JS	Rushton	Moth	Gipsy I	0 48	17 24	16 36	90½	7th.
RD	Duffie	Moth	Gipsy I	0 53	16 16	15 23	97½	1st.
RX	Miss Leathart	Moth	Cirrus III	1 03	16 33	15 30	96¾	3rd.
DA	Caldwell	Moth	Gipsy I	1 31	17 17	15 46	95	6th.
TR	Thorn	Spartan II	Hermes IIB	1 44	16 32	14 48	101¼	2nd.
IX	Leech	Active I	Hermes IIB	4 37	16 46	12 09	123½	4th.



SIDE BY SIDE: Two of the Comper "Swifts" (Pobjoy "R") started level. JR was flown by Mr. Mayers, and TC by Capt. Maxwell, who secured third place in the race with a speed of 129.25 m.p.h. (FLIGHT *Photo.*)

other Gipsy-Swift, averaged 158 m.p.h., as compared with 147¼ m.p.h. in the King's Cup Race.

Other pilots who put up very good speeds in the race were: Flt. Lt. Healy on the Arrow "Active I" ("Hermes II B"), 137¼ m.p.h.; Walker and Mayers on Pobjoy Swifts (126¾ and 126¼ respectively), and Miss Crossley on a similar machine (124 m.p.h.).

At the finish Styran, Brie and Gairdner failed to cross the line properly, and thus were not placed. It was said that Gairdner landed at Sherburn because his passenger was ill. Tangye's "Moth" finished in due course, but the pilot reported the machine to be much below its usual performance for some reason.

A local race was flown in two heats and a final over a 25 miles course. The winner was Mr. Duffie (of the Newcastle Aero Club) on a "Moth" ("Gipsy I"), whose speed was 97½ m.p.h. Second was Mr. S. A. Thorn in the Spartan II ("Hermes II B"), and third Miss Leathart, who was flying a "Moth" ("Cirrus III").

The pilots who had been flying in the London-Newcastle race were at a disadvantage in the local race in that they had had no time to practise the course, and some of them had some difficulty in finding the turning points. This accounts, for example, for the apparently poor performances of machines WA, WH, ZC and JR.

The meeting at Cramlington was run under difficulties, due to a strong westerly wind which occasionally veered into the south-west, but in spite of this the programme could be carried out with the exception of the parachute descent and the R.A.F. bombing display. The dinner and dance in the evening was well attended by pilots and club members, who spent a very enjoyable evening.

The next day (Sunday, August 7) Mr. Runciman invited those of the visiting pilots who were staying to lunch, and as many of the club members as possible, to fly up to Duxford, where lunch was provided. Eight machines attended, and everyone thoroughly enjoyed themselves.

READING NOTES

The sudden spell of fine weather has made both the Phillips & Powis School of Flying and the sales department exceptionally busy. Our de Havilland agent, Mr. Norman Edgar, of Bristol, has taken delivery of a new "Puss Moth." A Civilian Coupé was supplied to Mr. Downes-Martin of Salisbury, and a "Gipsy Spartan" to Mr. Bremridge of Yateley. A "Gipsy Moth" was also supplied to Miss Frost, an American, who is living in France; our managing director, Mr. C. O. Powis, delivered this machine to Orly, Paris, last week-end, and found quite a lot of private flying going on there, although most of the machines appeared to be of rather antiquated design and performance. However, some very smart "Puss Moths" were stored in the hangars, and quite a number of French-built metal "Moths." The English machines seemed to be thought a lot of, and it seemed to be the ambition of all French private owners to save up enough money to be able to afford to buy an English light aircraft.

Mrs. J. A. Mollison took delivery last week-end of her "Gipsy III Moth," in which she flew to Kilburn Castle.

Capt. C. B. Wilson, late of the *Daily Mail*, hired one of our Desoutters last Saturday, and made two journeys, one to Arras and one to Thiepval.

On Bank Holiday F/O. J. F. Lawn gave an aerobatic display at the British Legion Fête, Petworth, and considering the number of inquiries we are receiving for this type of entertainment, it appears that the organisers of Garden Fêtes and local Flower Shows are becoming quite airminded.

One of our "Gipsy Moths" has been hired to the Hon. Mrs. Victor Bruce for refuelling purposes during her endurance flight.

Mr. Godivala made a very fine solo flight last Tuesday, and Mr. A. Sims has now completed his tests for the "A" licence.

We would also like to congratulate Mr. B. Mirza on passing his "B" licence flying test—he learnt to fly at this school two years ago.

LONDON AEROPLANE CLUB

In order to give members as many facilities as possible for flying during the month of August, the staff are arranging their holidays in shifts instead of shutting down completely as hitherto. That this is appreciated by the members is proved by the fact that these last four days have produced the gratifying total of 52 hr., and it is hoped that many more will take advantage of the new arrangements.

Two new members are welcomed, Capt. J. T. Godfrey, R.E., who has just returned from Washington, and Mr. Felser Paine, of the Royal Indian Marines. There is already keen rivalry between them as to who will do a first solo. Mr. and Mrs. Mollison have been at the club practically every day during the last week or so, Mollison to keep an expert eye on the progress of his new "Puss Moth" G-ABXY, in which he will attempt the double Atlantic flight, and "Johnnie" to fly her new machine "Jason 4," which, incidentally, is the one Capt. Hubert Broad flew in the King's Cup Race. It is fitted with the new "Gipsy 3A" engine.

We also welcome Capt. and Mrs. E. S. Davis, who have returned to us from a holiday at Monte Carlo; we were pleased to note the promptitude with which they have once more resumed flying.

Mr. Basil Wallis passed his tests for the "A" licence during the week.

PLYMOUTH AIR WEEK

In order to popularise flying in Devon an "air week" has been arranged by Capt. Dean, Plymouth Air Port Officer, to commence on Monday, August 22, and to last for six days. The London Air Circus, recently formed at Broxbourne aerodrome under the leadership of Flt. Lt. Bannister, has been engaged to give aerobatics, displays and joyrides. Private owners are invited to "drop in" during the week to help to swell the number of machines. We understand that no landing fees will be charged.

HANWORTH NOTES

Hanworth has had a busy week. The local branch of the Comrades of the Royal Air Force held a garden party on the commercial side on Sunday, and no less than 165

of them (and their friends) partook of joyrides. Taxi trips were made to Berck by Flt. Lt. J. B. Wilson and Mr. Coupland, and to Arras by Flt. Lt. Wilson.

Capt. Ayre and Flt. Lt. M. H. Findlay went to Oundle on Tuesday to rescue Maj. D. Osmaston who had had a forced landing in a small field. They took spare parts and enabled the machine to fly back to Hanworth the same day. Night flying was continued (with the Chance floodlight) until 00.30 hr. on Thursday. Solo machines were booked up all through the week.

Workshops are also busy. In addition to routine work on N.F.S. aircraft, Mr. Courtauld's Bellanca, which has now been bought by Capt. the Rt. Hon. F. E. Guest, is undergoing a refit. The cabin (originally a six-seater) is being converted to a "chauffeur-driven" two-seater with "outside" seats for two pilots, and a new spar has been fitted. The whole machine will be repainted silver when the alterations and repairs are completed.

Speedy service was also rendered to a Desoutter which bent rudder and fin at Stoke, Capt. Ayre flying up with new parts and bringing the machine back to Hanworth on the day of the accident.

The "conducted tour" undertaken to Devonshire in May by eight N.F.S. machines proved so popular that Flt. Lt. M. H. Findlay organised a larger party, of eight "Moths," one Bluebird and one Alfa Romeo, to Ostende on Sunday, July 31. The personnel consisted of Maj. G. Petit, Flt. Lts. M. H. Findlay and R. H. Allen, Messrs. J. Beard, E. Schwerdt, A. Reid, G. Cannon, L. Chen, E. Holder, M. Harley, H. C. Paul, E. Higgs, H. Smith, — Smith, Lady Muskerry, Mesdames Holder, Higgs, Battye, Cathcart-Jones and Miss Strangeways.

Leaving Hanworth at 14.45 hr. the party flew in formation to Lympne, where they cleared Customs, special arrangements being made by Mr. Deacon for a speedy clearance. They then proceeded to Ostende in formation, arriving without incident at 17.50 hr. Some of them patronised the Casino successfully (for the Casino) in the evening. The Hotel Splendide, where the whole party was billeted, evoked considerable praise of the excellent service provided.

On Monday morning Flt. Lt. M. H. Findlay led a "V" formation into the sea, where the greater part of the day was spent. They left Ostende Aerodrome, where every assistance had been given to pilots and aircraft, at 17.00 hr., flew along the shore to Cap Gris Nez, crossed to Folkestone, cleared Customs, and landed at Hanworth at 21.00 hr.

The traditional parish magazine phrase "a good time was had by all" seems to summarise the feeling of those who went on this trip, but they apparently had an even better time than that.

In addition to numerous inquiries from all parts of the United Kingdom, the Hanworth Club received during July requests for information from Brisbane (Australia), Peru, India, Federated Malay States, New Zealand, Switzerland, Austria, Kenya, Japan, Germany and the United States.

For fourteen days without a break M. Georges Seversky, the singer, has been using an aeroplane in order to fulfil two daily engagements—one at the Casino at Deauville, the other on the Show Boat on the Thames.

His idea has been to prove that business men can use aircraft with confidence. Although he has been spending seven hours daily in the air and flying himself, his voice, M. Seversky says, has never been better, and he has never felt more fit. He has been doing his own maintenance and has had no trouble with his "Gipsy Moth."

NEXT STOP NEWCASTLE: Mr. Healy gets away in the Arrow "Active I" ("Hermes II B"). He put up the very good speed average of 137.25 m.p.h. over the 264 miles course from Brooklands to Cramlington, via Sherburn. (FLIGHT *Photo.*)

STARTING ON ITS FIRST LONG RACE: The "Autogiro" cabin machine, piloted by Mr. Brie, averaged 103.5 m.p.h. in the London-Newcastle race. (FLIGHT *Photo.*)

M. Seversky was in the Russian Imperial Air Force from 1915 (when he learned to fly) to 1917, when the revolution took place. He then joined the White Army, and in 1921 became Chief Instructor of Military Aviation in the Georgian Republic. Shortly afterwards he gave up flying until 1930, when he went through a refresher course at Hanworth.

GOSSIP FROM GATWICK

The feminine element was well to the fore during the last week. Miss Aitken did her first taxi trip, when she conveyed Miss Sewell to Heston to collect her machine, in which she put up such a very good show when she flew it out solo to Transjordania at the end of last year.

All this was rather overshadowed by an amusing, and extremely exciting, incident which happened a few days ago. Out of the clouds appeared a vision, clad in the most immaculate "aviatrice's" equipment, and promptly touched down on one of our new boundary marks, smashing the marks to splinters, but not damaging her machine! The vision, however, hadn't noticed anything at all, but her boy friend in the front seat said that he *did* hear an unusual sound. After rhapsodising about our oak beams and our dove cots, they said they must be beating it for Croydon, which the vision did by taking off down wind, and then heading in a southerly direction, the wind being 15 m.p.h. and Croydon being due N.!

The club house has been full up with people spending "flying week-ends" at Gatwick. Messrs. C. H. Wilson and J. Buckley flew down from Woodford. They spent the evening shooting rabbits in the spinney on the aerodrome.

On Sunday a party of club machines went down to Shoreham, and had a bathe, and then went and landed in a convenient field near Chanctonbury Ring and had a picnic tea. A thoroughly good way of spending a hot Sunday afternoon.

[But did the Ground Engineer pass the machines out after they had had their "bathe"?—ED.]

BROOKLANDS

Several new pupils have joined, including Sir Robert East Clayton, who is the owner of a most attractive blue and white Avian. He has done a considerable amount of flying in various parts of the world, and now proposes to take his "B" licence. He is having a little advanced dual on his own machine before doing his night and other tests.

Two first solos are to be reported this week—those of Mr. Penn Hughes and Mr. Telders. The latter is the son of the managing director of the Royal Dutch Air Line. It is a tribute to the reputation of British flying that he should have chosen a British school for his lessons.

Mr. Mistinger, the Viennese pupil whom we have already mentioned in these notes, has now completed his height tests, and his barograph chart is a model one. Mr. McLaren has also done his height tests during the week.

Three Indian pupils, Messrs. Gadzar, Morad and Gadgil, have successfully completed their blind flying courses.

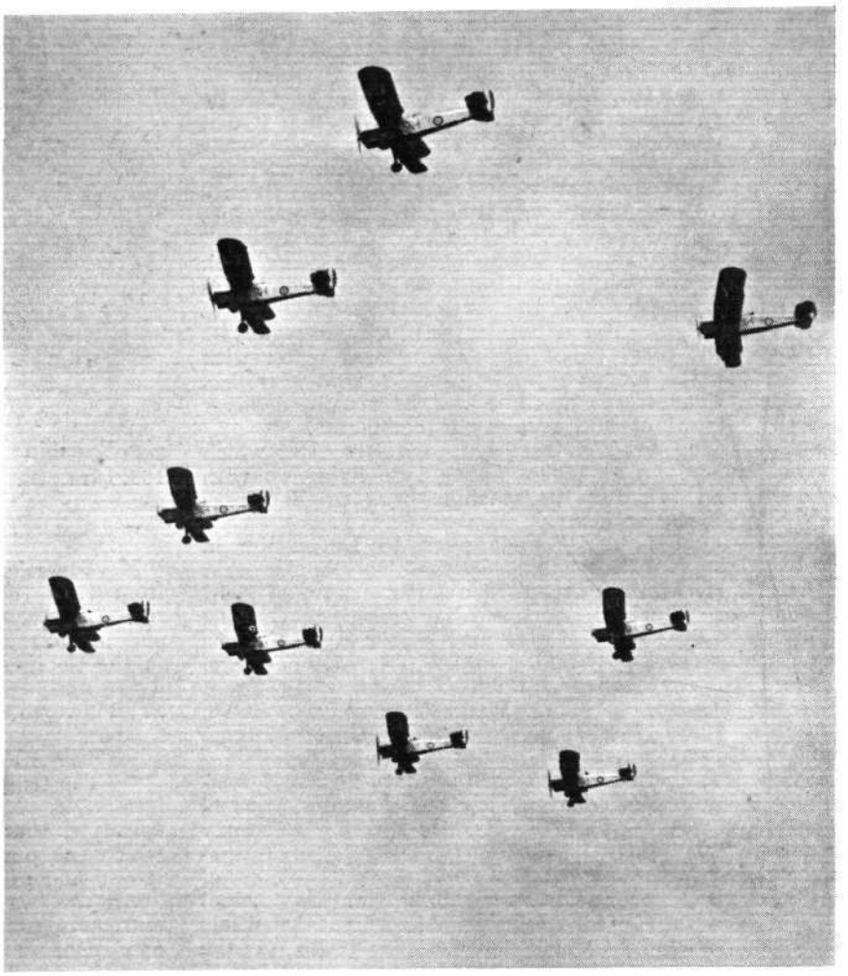
Mr. Ahlers has completed the hundred hours required for his "B" licence, and on Friday morning set out for Amsterdam on a short visit, with Mr. Telders as passenger.

(*Concluded on page* 768)

No. 1 AIR DEFENCE GROUP

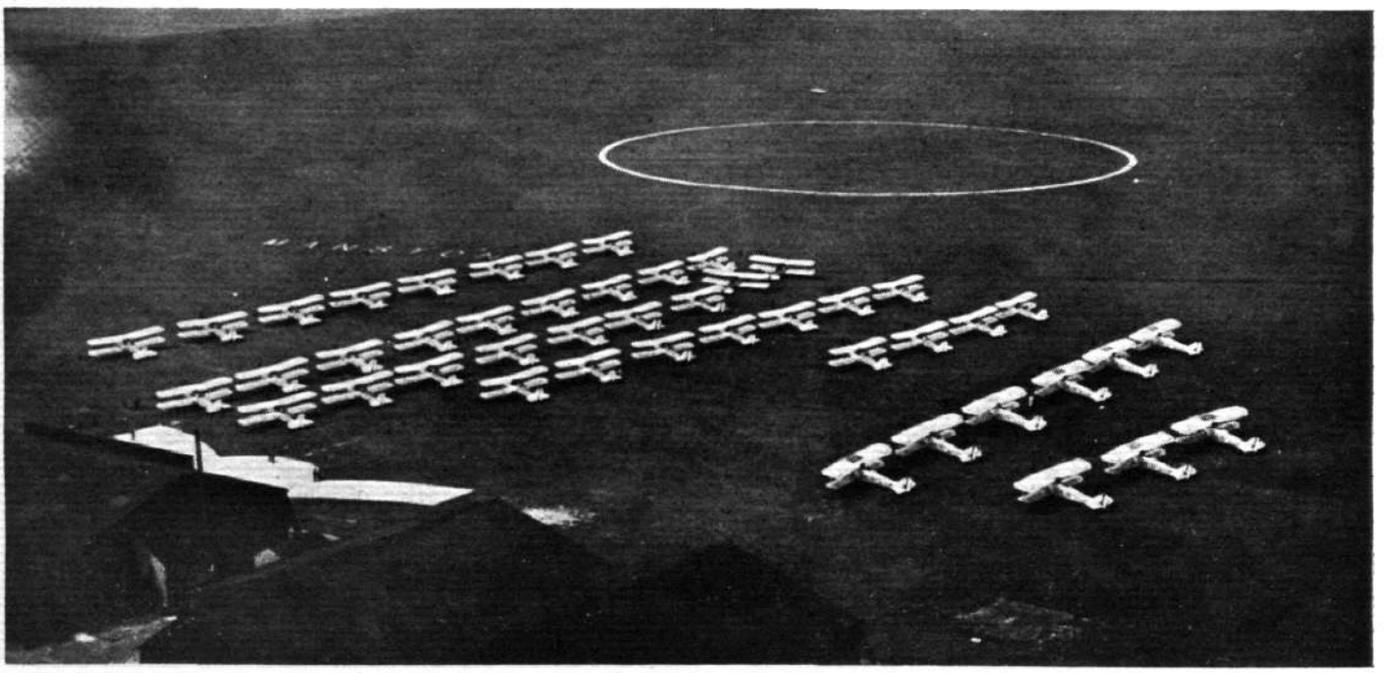
Speedy Concentration of Squadrons

THIS is the season when most of the Auxiliary Air Force and Cadre Squadrons are in camp for annual training, and the air over the counties of Kent and Sussex is every day full of the white wings of "Wapitis" and "Horsleys." The Cadre squadrons (which consist of one flight of regulars and the remainder of Special Reserve personnel) concerned are No. 501 (City of Bristol) (Bomber) Squadron, which flies "Wapitis," encamped at Manston, and No. 504 (County of Nottingham) B.S., in "Horsleys," at Hawkinge. The A.A.F. squadrons are encamped as follows:—No. 600 (City of London) and No. 604 (County of Middlesex) at Tangmere, and No. 601 (County of London) at Lympne, and No. 605 (County of Warwick) at Manston. In a Cadre squadron the C.O. is a regular and so are about 75 per cent. of the total personnel; but in an A.A.F. squadron the only regular officers are the adjutant and assistant adjutant and the stores officer, while there are about 30 regular airmen, largely of the sergeant instructor category. Of the individual work of some of these squadrons we shall have more to say in the near future. For the moment we are more interested in the general work of the whole organisation of citizen airmen.

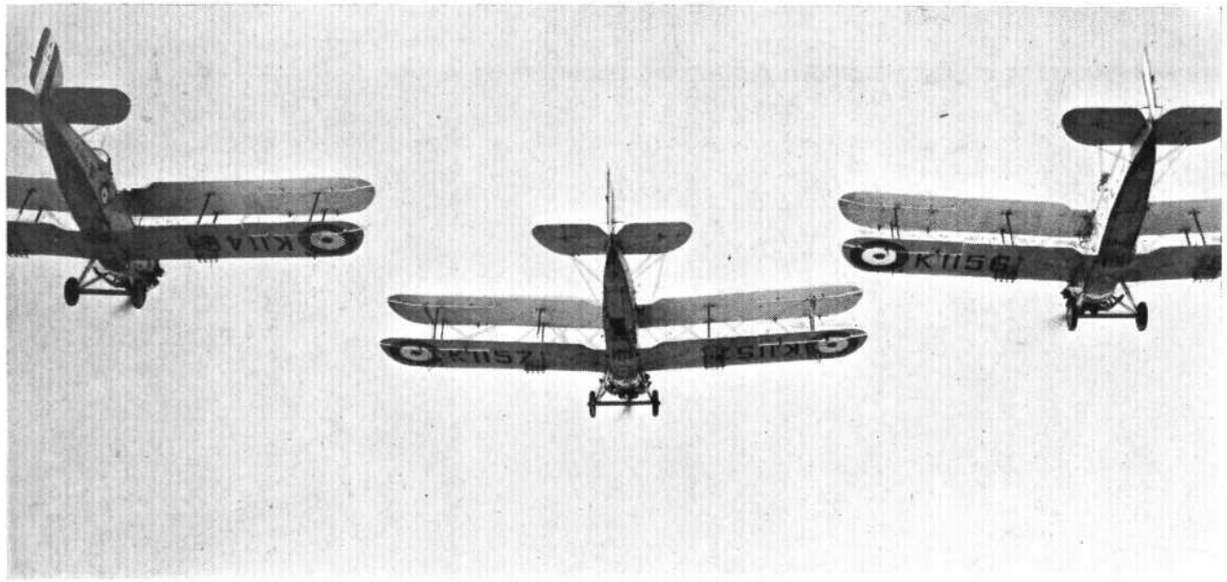


A CADRE SQUADRON: No. 504 (County of Nottingham) (Bomber) Squadron flying to Manston. The machines are Hawker "Horsleys" (Condors). (FLIGHT *Photo.*)

For the convenience of those readers who do not possess an Air Force List, it may be remarked that all the Cadre squadrons are numbered from 500 upwards, while all the Auxiliaries are numbered from 600 upwards. At present there are five Cadre squadrons known as County of Kent, City of Bristol, Ulster, County of Lincoln, and County of Nottingham. In the Auxiliary Air Force there are eight squadrons. Four have been mentioned above, and

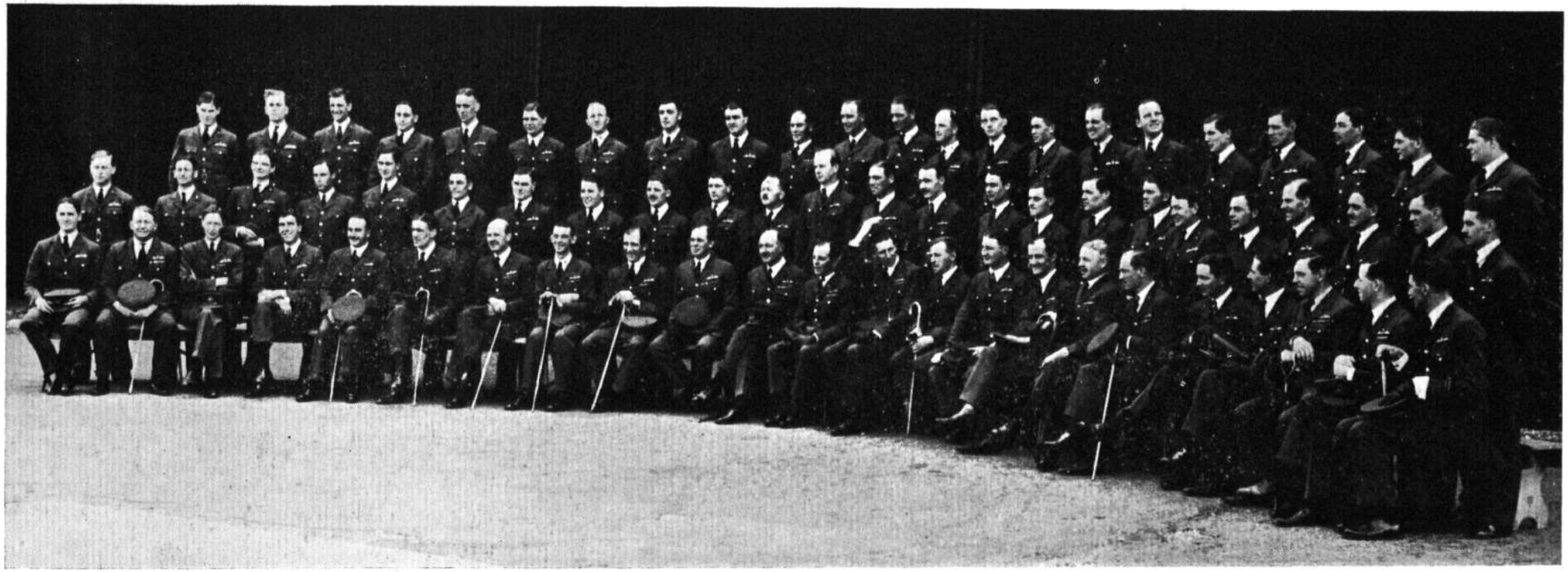


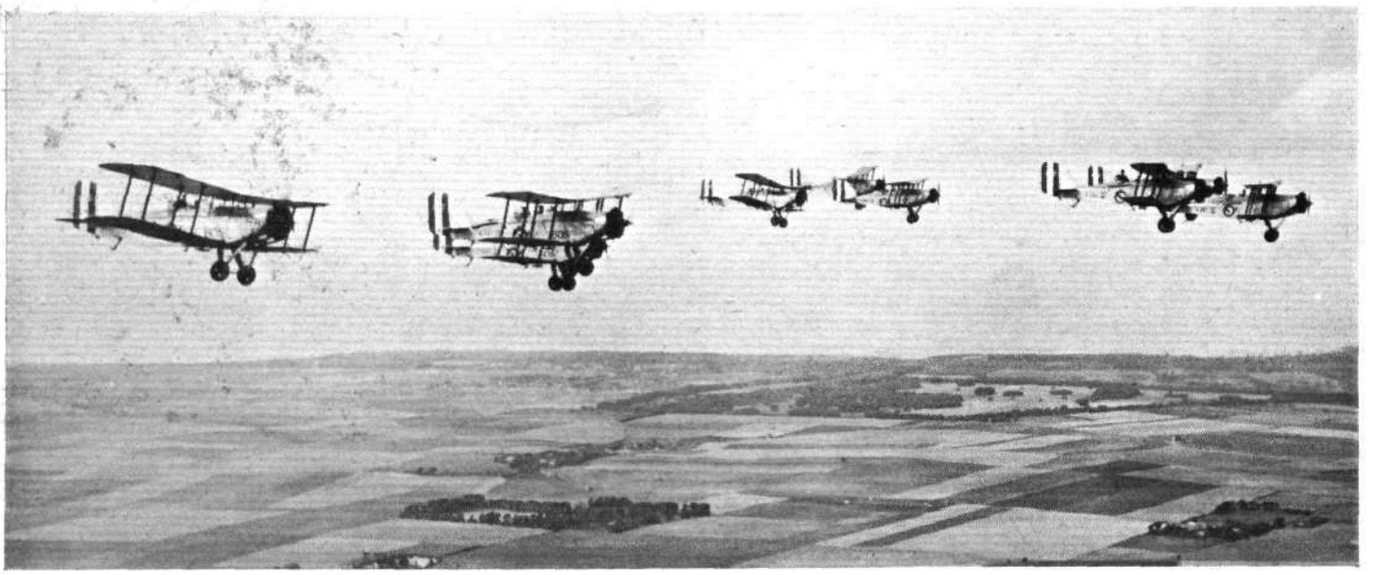
No. 1 AIR DEFENCE GROUP: The concentration of six squadrons of the Group at Manston on Friday, August 5. Misty weather prevented some squadrons from arriving in full strength. The squadrons are Nos. 501, 504, 600, 601, 604, and 605. All fly "Wapitis" except No. 504, whose "Horsleys" are drawn up in two lines in the rear. (FLIGHT *Photo.*)



THREE "WAPITIS": A Flight of No. 605 (County of Warwick) (Bomber) Squadron over Manston. Last year the Prince of Wales visited this squadron and presented the Esher Trophy to them, and they are said to be hot favourites for the Trophy again this year. (FLIGHT *Photo.*)

A GROUP OF THE GROUP: The first great gathering of No. 1 Air Defence Group ever held. Air Commodore W. F. MacNeece Foster, C.B.E., D.S.O., D.F.C., and some of his staff at Manston with the officers of Nos. 501, 504, 600, 601, 604, and 605 Bomber Squadrons. (FLIGHT *Photo.*)

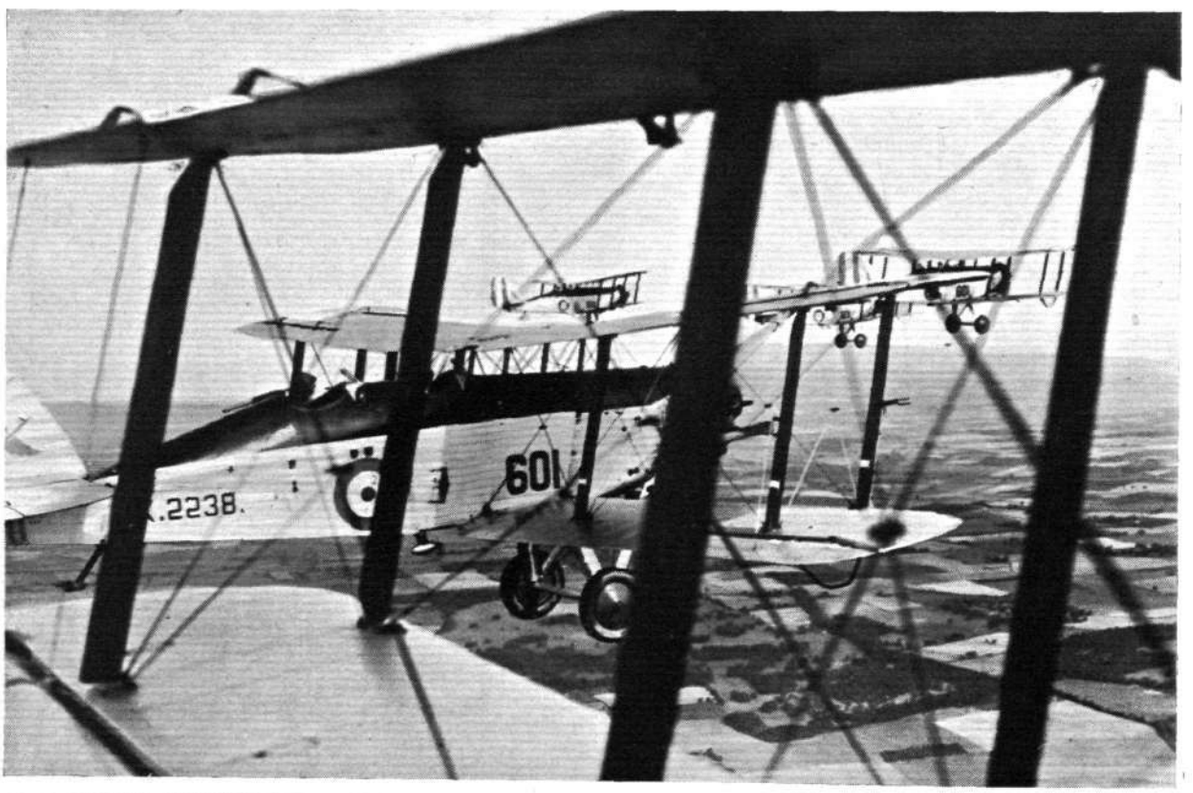




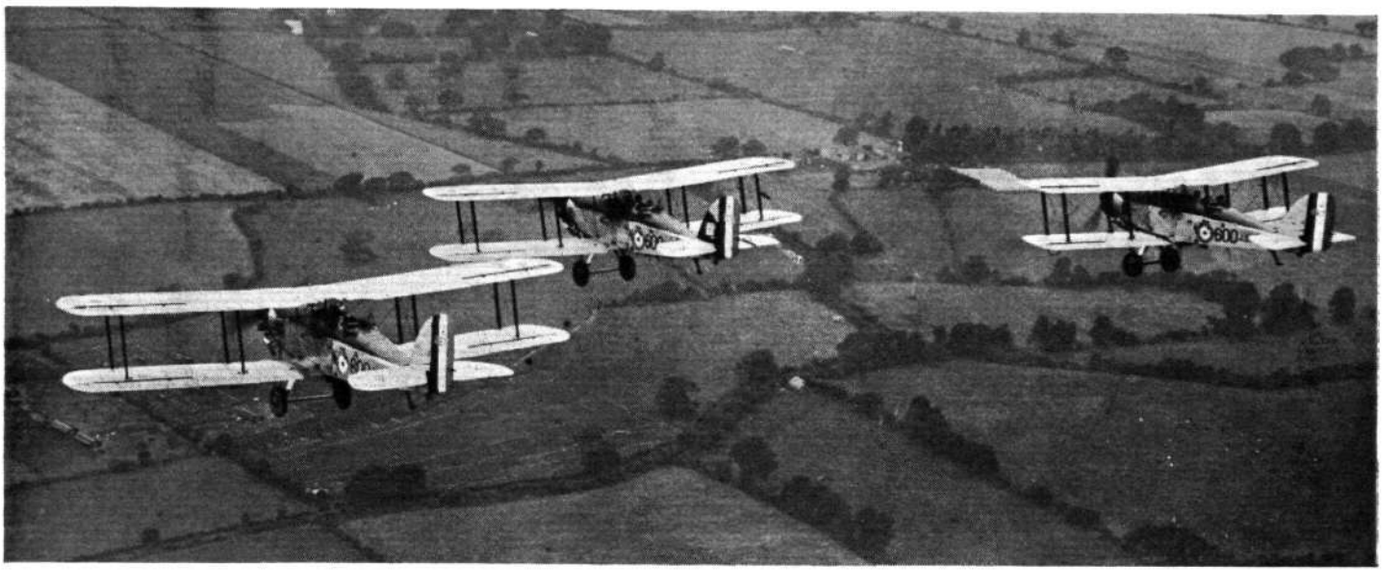
THE TROPHY-HOLDERS : No. 605 (County of Warwick) (Bomber) Squadron holds the Esher Trophy for the third time. It is encamped at Manston and is here shown flying over Thanet. The machines are " Wapitis." (FLIGHT *Photo.*)

the others are the City of Glasgow, the City of Edinburgh, County of Durham, and North Riding. All the squadrons with a non-regular element are bomber squadrons. The County of Kent, Ulster, and County of Lincoln are night bombers, the first two using the " Virginia " and the last-named the " Hyderabad." The County of Nottingham uses the " Horsley " and all the others the " Wapiti." There has been talk at times of making some of these squadrons into fighters, but the squadrons themselves are against the idea of using single-seaters. They say that it would militate against recruiting airmen. There are no airmen pilots in any of these squadrons, and yet the chance of getting into the air is a great attraction to men when they enlist as aircraftmen. At present whenever a machine goes up there is always an airman in the rear cockpit as gunner, or bomb-aimer, or photographer, or wireless operator, and the men simply love their duties in the air. All of them are expected to be able to use the machine gun, whether they are specialists on some other form of work or not. Great efforts are made to see that during the annual fortnight in camp every airman gets into the air at least once. If single-seaters were introduced this great attraction would be lost, and recruiting might suffer in consequence. The A.A.F. squadrons are keenly hoping that before long they will be re-equipped with the " Hart." There would seem no objection to giving them the " Demon " and making some of them into two-seater fighter squadrons.

All the non-regular squadrons are administered by a Group, known as No. 1 Air Defence Group, which in turn



AIR WORK UNLIMITED : Sqd. Ldr. Nigel Norman leads No. 601 (County of London) (Bomber) Squadron from Lympne to the Manston concentration. Intelligent readers will recognise the machines. (FLIGHT *Photo.*)



SOMETHING IN THE CITY : Three Westland " Wapitis " (Jupiter) of No. 600 (City of London) (Bomber) Squadron on their way from Tangmere to Manston. (FLIGHT *Photo.*)

is under Air Defence of Great Britain. The Air Officer Commanding the Group is Air Commodore W. F. MacNeece Foster, C.B.E., D.S.O., D.F.C., and his chief staff officer is Wing. Com. A. H. Orlebar, A.F.C., of High Speed Flight fame. The address of the headquarters of the Group is 33-34, Tavistock Place, London, W.C.1, and we would ask all our readers who are desirous of becoming citizen airmen to make a note of this address. We are constantly receiving letters from enthusiasts asking us to tell them how to join the Auxiliary Air Force. The answer is that they should write to the Air Officer commanding No. 1 Air Defence Group at that address.

Last week the A.O.C. went down to Manston, accompanied by Wing Com. Orlebar and Flt. Lt. H. J. Saker. The idea occurred to him that with so many of his squadrons under training on the aerodromes of Kent and Sussex, it would be an excellent thing to arrange a concentration of the Group. Rapid concentration is often very necessary in times of emergency, and to carry it out without a hitch usually requires not a little organisation and practice. This concentration, however, was to be carried out at short notice. The decision was come to on Thursday afternoon, and the squadrons were to assemble at Manston on the next morning. The telephone lines got busy, and all the squadrons were informed. Detailed orders were drawn up, but they only covered two sheets of foolscap. It is often the case that simplicity and brevity make for efficiency. None the less, organisation was necessary. Manston is a large aerodrome, which until recently was used by a squadron of " Virginia " night bombers. It would not do, however, to have four visiting squadrons arriving over it and seeking to land simultaneously. Each of the four visitors was given its time for taking off from Tangmere, Lympne, and Hawkinge, and its time for landing at Manston.

Everything worked like clockwork, except perhaps the weather. The latter was patchy. At Lympne it was glorious, but round Tangmere there were areas of low mist. This prevented some of the machines of No. 600 from getting through, and they had to turn back. All the others arrived in strength and up to time. The six squadrons drew up their machines at Manston, squadron behind squadron. Never before had there been such a gathering of Auxiliary and Special Reserve pilots. Each squadron was exerting its best efforts to keep specially accurate formation, and each was keenly critical of all the others. So was *esprit de corps* fostered (we sternly resist the temptation to write MacNeece Fostered), and at the same time the Group was encouraged to think of itself as a corporate entity, an organisation to which a man might feel proud to belong. The officers of the various squadrons met each other, and there was a general pow-wow, which, though it did not perhaps solve all the problems of air defence, was at least a useful opportunity for comparing ideas.

Then the squadrons took off and flew as a Group in the air. A *rendezvous* up above was previously fixed, and then each squadron took off in turn. Within seven minutes of the order being given, the first squadron had taken off, and within five minutes more the whole six were in the air. They rallied in the air, forming up as a Group with squadrons in line astern. The City of Bristol led the formation, and some 400 yards distance separated each squadron from the one behind it. The formation was extremely imposing, and considering how little time had been given for preparation and organisation, the work done was very good indeed. The Group flew over Manston and each squadron in turn dived in salute. They then separated and returned each to its own aerodrome in good time for lunch.

F. A. DE V. R.

Von Gronau's Atlantic Flight

SOME further details are to hand of Von Gronau's flight across the Atlantic from Germany to Labrador via Iceland in a Dornier " Wal." The start was made at 11 a.m. on July 22 from List, on the island of Sylt. There was a flat calm, which made the start very difficult, but a Dornier " Super-Wal " came to the rescue by taxying ahead of Von Gronau, thus giving him the benefit of its wave-making and slipstream, and helped the overloaded flying boat to get off the water. Shortly before 7.50 p.m. Von Gronau landed in Seydisfiord, on the east coast of Iceland. The distance of 1,120 miles had been covered at an average speed of 112 m.p.h. On July 23, the machine resumed the journey at 11.55, and alighted in Reykjavik at 3.5 p.m. The *Greenland Whale* started from Reykjavik at 10.30 a.m. on July 25, and landed shortly before 7 p.m. at Ivigtut, on the south-west coast of Greenland. On July 26 the flight was continued at 12.25, Central European Time, and the machine alighted at Cartwright, on the coast of Labrador, at 10.45 G.M.T. The actual landing took place in thick ground fog by the aid of wireless, as Von Gronau had cruised about over Cartwright since 8 p.m. The flying time for the third flight across the North Atlantic in the westerly direction was 28 hr. On July 26, at 6.50 p.m. Eastern Standard Time, a start was made, and the course set for Montreal, which was reached on July 27. This stage was one of 1,000 miles. Chicago was reached on August 2. The flight this year was made in the same type of machine, *i.e.*, a Dornier " Wal " flying boat, as that used by Von Gronau in his 1930 and 1931 flights. The machine is fitted with two B.M.W. VII engines, and on all three flights Herr Von Gronau has relied on Shell Aviation Spirit and Shell Oil—on the last two flights he has used Aero-Shell Oil between Germany and Canada. We understand he proposes to continue his flight via Milwaukee, Lac du Bonnet, Lac la Biche, Prince Rupert, Cordova (Alaska), Dutch Harbour (Aleutian Island), Chicagof Harbour (Attu Island), Katumabetsu (Horomushiro) and Nemuro (Hokkaido). On arrival at Tokio the pilot will decide by which route to return to Europe, but he is expected to fly via Negasaki, Formosa or Hongkong, Manila, Sambalang, Sourabaya, Batavia, Palembang, Sabang (or Mergui, Rangoon, Chilka Lake), Trincomali, Mangalore, Bombay, Karachi, Bunder Abbas, Basra, Alexandretta, Athens, Naples, Pisa, Friedrichshafen.

AIR TRANSPORT

A NEW BOEING TRANSPORT PLANE

DESIGNED especially for speedier transportation of passengers by air, a plane that will slash hours from present coast-to-coast flying schedules has been designed by the Boeing Airplane Company, of Seattle, and a large order has been placed in production for United Air Lines.

The new transport, which will be powered with two special 550-h.p. "Wasp" engines mounted forward of the leading edge of the wing, will have a high speed of 175 m.p.h. and a cruising speed of 155 m.p.h., with full load of fuel for 500 miles, 10 passengers, 500 lb. of mail and express and crew of two. With this load the plane will be able to climb to an altitude of 18,000 ft., or 6,000 ft. higher than is necessary to cross the highest mountains on the transcontinental airway.

As a result of the unusually large range of the new planes, the longest divisions existing on the transcontinental line can be flown without stopping for fuel and with a reserve of 35 per cent. of fuel in the tanks to care for adverse weather conditions and other contingencies. The flight from coast to coast can be made with only six stops for refuelling, where 14 stops are now required.

The new transport will have a wing span of 74 ft. and a chord of 15 ft. at the fuselage. It will be 16 ft. in overall height and 51 ft. 5 in. in length. Fully loaded, it will weigh approximately six tons.

The plane is of Boeing semi-monocoque all-metal construction, duralumin being used chiefly. It embodies principles successfully employed in the Boeing twin-engined monoplane bomber produced last year for the Air Corps, which was illustrated in our issue for November 13, 1931, and also the Monomail, an all-metal, single-engined monoplane now being operated by United Air Lines.

Features of the transport include full streamlining and freedom from parasite drag, along with a retractable landing gear. It is being completely bonded and shielded for radio telephone installation, and latest aids to night flying in the form of lights and flares are to be incorporated.

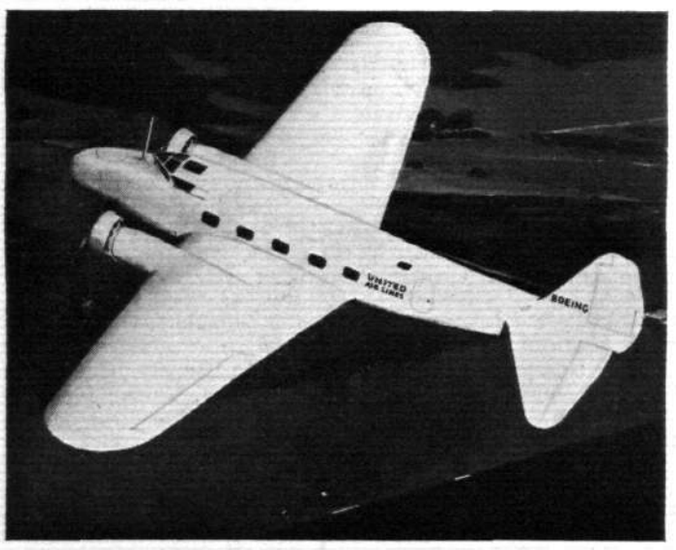
The spacious cabin, which will have an interior height of 6 ft., will include such travel conveniences as hot-water radiators with air-circulating fans which may be inverted for use as cooling systems during the summer season; a double ventilating system, including main fresh-air intakes and air outlets, supplemented with individual ventilation facilities; insulation to subdue noise; lavatory, and individual reading lamps at each chair. The upholstered seats will have adjustable backs which may be set to reclining position. The chairs are to be spaced 40 in. apart.

The forward compartment for pilot and co-pilot will be perhaps the most modern of any transport aeroplane cockpit, and includes features being used for the first time on the new Boeing. There will be a special rudder flap control to permit more than ordinary ease of directional control, along with an adjustable elevator flap to compensate for variations of loading conditions. The retracting mechanism for the landing gear will be operated electrically, with a manual auxiliary control provided for emergency use. If the landing wheels are in retracted position when the pilot closes the throttle prior to landing, warning lights on the instrument panel and also audible signals remind him to lower the gear.

In addition to standard navigating instruments, there are to be three pairs of instruments whose functions are duplicated. These include the directional gyro, and compass; the sensitive altimeter, recording elevation in hundreds instead of thousands of feet, and the rate of climb indicator; and the turn and bank indicator and the artificial horizon. A feature of the pilot's cockpit will be the inclusion of a gauge by means of which pilots may read the cylinder head temperatures of any of six individual cylinders.

An outstanding feature of the plane is to be the excellence of visibility provided in the cockpit.

Compartments directly in front of the cockpit will house mail and the radio telephone equipment, and additional space at the rear of the passenger cabin will accommodate baggage and express.



The new Boeing Air Transport, an all-metal low-wing monoplane fitted with two 550-h.p. "Wasp" engines.

The New Air Mail Rates

IN our issue for August 5 we made brief reference to the special rate for postcards carried by Air Mail just introduced by the G.P.O. We now publish the list of charges in full, viz.:—

Country of Destination	Air Mail Post-card Rate	Country of Destination.	Air Mail Post-card Rate
	s. d.		s. d.
All European countries shown in Section A, page 3, of the Air Mail Leaflet	0 2½	Chile	2 0
Africa (North)—		Colombia	1 0
Algeria	0 3	Cyprus	0 2
Morocco		Dutch East Indies ..	0 7
Tunis		Ecuador	0 10
Africa (West)—		Egypt	0 2
French Guinea	0 5	French Indo China ..	0 8
Senegal		Guianas	0 10
Gambia		India—	
Sierra Leone		By air to Karachi ..	0 3
Africa (East)—		By air to Delhi ..	0 4
Kenya	0 3	Iraq	0 3
Uganda		Malay States	See Straits Settlements.
Tanganyika		Mauritius	0 5
Nyasaland	0 4	Mexico	0 5
Portuguese East Africa	0 5	New Zealand	0 3
Africa (Central)—		Palestine	0 2
Belgian Congo (via Sudan)	0 4	Paraguay	2 0
Belgian Congo (Internal)	0 2½	Persia	0 3
Africa (South)	see separate entry.	Peru	1 0
		Rhodesia (Northern and Southern)	0 4
Argentine Republic ..	2 0	Russia in Asia ..	0 6
Australia—		Siam	0 6
By air in Australia ..	0 3	South Africa—	
By air to Karachi, thence by ordinary route ..	0 3	Direct air mail ..	0 5
		Internal air mail ..	0 2
By air to Karachi and by air in Australia ..	0 4	Straits Settlements and Malay States ..	0 6
Bolivia	2 0	Sudan	0 3
Borneo (North), Brunei and Sarawak	0 6	Syria and Transjordan	0 2½
Brazil	1 9	United States of America	0 3
Canada	0 2	Uruguay	2 0
Central America—		Venezuela	0 10
Costa Rica	0 7	West Indies—	
Guatemala		Cuba	0 3
Honduras		Jamaica	0 4
Nicaragua		Dominican Republic, Haiti, Porto Rico, Leeward Is., Windward Is., Barbados, Trinidad	0 7
Panama			
Salvador			
Ceylon—		Zanzibar	0 3
By air to Karachi ..	0 3		
By air to Delhi ..	0 4		

All the rates quoted include ordinary postage. Imperial and Foreign reply paid post-cards can also be sent by air mail. The outward half of the card must be prepaid at the rates shown above but the reply half of the card can only be prepaid 1½d. The original sender of the card cannot prepay the reply half of the card for return by air mail.

London-Rome in 14 Hours

TRIALS were commenced on August 2 on the Milan-Zurich air route with a new time-table, whereby passengers and mails will be able to complete the journey between Rome and London easily in one day. Leaving Rome at 6.30 a.m. passengers arrive at 10 a.m. at Milan, where they link up with the Milan-Zurich aeroplane, which leaves at 10.30, reaching Zurich at 12.30, Paris at 5.30 p.m., and London at 8.15 p.m.

AIRPORT NEWS

CROYDON

A PLAQUE in memory of the late Air Vice Marshal Sir Sefton Brancker, K.C.B., A.F.C., who lost his life in the appalling disaster to the R101, was unveiled early in the week. The plaque is a beautiful piece of workmanship, consisting of Sir Sefton's image beaten out in bronze, with his name, honours and year of birth and death inscribed below. Underneath the plaque is a small oak strip worded thus: "Erected by his friends at the Air Ministry." A small civil air ensign beautifully worked in silk hangs on each side of the plaque. It is situated on the wall facing the stairway up to the roof. The ceremony was carried out very quietly and reverently, and only those who knew him intimately were present. It is a delightful tribute to a great man, a memorial for all times from those who worked with him and under him, admired and respected him.

The days of instructional flying at Croydon are now getting very near their end, and most of the firms have made arrangements to carry on elsewhere. Most of them will keep at least one machine here for joy-riding. Messrs. Rollason, Muir & Rickard have lost no time and are now well established at Ford Aerodrome, where in future all their school work will be done. They have also formed a flying club there, which is going quite successfully.

We were fortunate at Croydon on August Bank Holiday, for, whilst we were surrounded by thunderstorms and bad weather, Croydon itself was reasonably good. Only one heavy shower marred the day, and plenty of business was done. As usual after a Bank Holiday, the scene down the road and in the enclosures was a sight for the "Anti-Litter Society." Paper everywhere, sandwiches, bottles and everything else connected with picnic parties. Business on the Continental lines is still exceptionally good, and it certainly looks as if 1932 will be civil aviation's record year. There is every indication that it is really coming into its own at last, and one can foresee the day when it will not only pay its way but will show big profits. The type of passenger using the airways now is the type that has been wanted to really establish aviation as one of the normal forms of transport, and that is, to use a famous advertising slogan, "Mr. and Mrs. Everyman" and family.

The first cabin type Klemm to visit Croydon arrived on Friday from Zurich, piloted by Mr. R. Fretz, of the Swiss Aero Club, and although one was unable to have a good look at it, what I did see of it appeared quite a comfortable little outfit.

Capt. Norman MacMillen, who is quite a stranger at Croydon these days, paid us a visit on Friday also, in an Avro Cadet.

Mr. Campbell Black also drops in and out quite a lot since he has been back in England.

The HP.42 that tried to push the bottom out of Hanworth Air Park some weeks back returned to its rightful home this week, and is now back again on regular services.

The Luft Hansa night service to and from Berlin is being extended to the end of October this year. The efficiency of this service is remarkable: this company give a 100 per cent. service, and to the business man who sends his goods by this service he can rest assured they will arrive on time.

Traffic figures for the week:—Passengers, 3,819; freight, 74 tons.

P. B.

FROM HESTON

SUNDAY, July 31.—All our night flyers were in possession of an "A" licence on this date and were very keen to test their powers of landing by the floodlight. Although all agreed that the floodlight, with shadow bar, was excellent, several found it more difficult than in daylight to make a "three-point" landing. Mr. E. A. Mead made his first solo flight on a School machine.

Monday.—One of the Airwork machines was chartered to take two Press photographers to Thiepval for the unveiling of the memorial. Personal Flying Services, Ltd., also had their Junkers, piloted by Capt. W. Ledlie, on the same mission, he having four passengers. Two machines arrived back from Berck after a week-end at Le Touquet. Capt. Ledlie left later in the day with G-ABDC for Dublin with passengers attending the Dublin Horse Show.

Tuesday.—Mr. J. H. Heap carried out his first solo flight after 5 hr. 50 min. dual instruction. The Banco "Puss Moth" set off for Jersey at 10 a.m. Mr. Ten Bos arrived from Brussels in his "Pander"; also a Comper "Swift," two machines from Berck and one from Paris. Mr. S. Davenport made an exceptionally quick trip from Hamburg to Heston in his "Puss Moth," with one passenger. He took 2 hr. 15 min. from Hamburg to Amsterdam and after a stop at Amsterdam set off for Heston, the time for the latter portion of the journey being 2 hr. 30 min.

Wednesday.—Mr. J. H. Heap carried out his tests and completed the requisite solo time to qualify for an "A" licence. A merry little flight of "Moths" left Heston to-day for a tour of the Continent, their first stop being St. Ingelvert, where they were to make up their minds as to the next "hop." However, in the case of two this was made up for them, as their "Carnets" were found out of date. They flew back to Lympne, telephoned to Heston, and two fresh "Carnets" were immediately despatched. Mr. Ten Bos left for Twenthe (Holland) in his "Pander." Twenthe is a new aerodrome recently established with Customs facilities. Mr. Bulman, with one passenger, arrived from Ostend in a Hawker "Tomtit," and Mr. Gibbons from Berck in his "Klemm." Mr. Richard Allen, a young Australian Auxiliary Flying Officer, on leave, decided to fly back to Australia, bought a Gipsy I "Moth" from Brian Lewis & Co., and started off on his journey at noon to-day. He intends to treat the journey as one of pleasure and not attempt to break any records. He is buying his outfit as the different types of clothing become necessary. He left wearing a lounge suit and to all appearances was merely setting off on a cross-country flight.

Thursday.—Lady Kathleen Rollo's young son and daughter came to Heston to-day to have long joy flights. They are looking forward to the day when they, like their mother, can fly their own aeroplane. Lady Howard de Walden and family have missed their flying so much since leaving town that they sent for their aeroplane, and it was flown up to Wrexham for them by a pilot of the

OFF TO AUSTRALIA: Mr. A. E. Lawson, Engineer of the Vacuum Oil Co., saying good-bye to Mr. Richard Allen, who set out on August 3 from Heston in a "Moth" (Gipsy I) on a leisurely flight to Australia. This machine, appropriately enough, bears the registration letters C-AAUS.

Airwork School of Flying. Mr. L. F. Horne arrived from Zoute at noon in order to attend a business meeting, returning there after tea in his "Moth." Flt. Lt. Hattersley arrived from Paris in a "Puss Moth," and the Banco "Puss Moth" returned from Jersey.

Friday.—Flt. Lt. Atcherley arrived at Heston to-day from Amman, Transjordania, on two months leave. He left Amman last Sunday, reaching Constantinople the same night, but was held up there until Wednesday morning, as he had no permit to fly over Turkey. On Wednesday he flew to Sofia, to Cologne on Thursday, and to Heston on Friday, arriving just after lunch. The Spring Grove Conservative Association—Ladies' Section—visited us to-day, Mrs. Nias, the Charter Mayoress of Heston and Isleworth, looking after the party. Mr. Ahlers cleared Customs and left for Ostend and Amsterdam in a "Moth," with one passenger, and Mr. Meny in his "Puss Moth" for Berck with one passenger. The "Puss Moth" (G-AAXV) of the First International Agency arrived from Brussels, piloted by Capt. Preston, with one passenger, on completion of an extended Continental tour. Airwork School of Flying are keeping up their good record for this year, several new pupils having already started instruction this month. Evening flying seems to have suddenly jumped into popularity, as after tea each day this week all the School aeroplanes have been fully employed continuously up to past 9 p.m.

Saturday.—One private owner set off to Cologne and Berlin in his "Puss Moth" on a business trip, and Mr. Alderson to Zoute in his "Moth" with one passenger. Mr. Ahlers, with one passenger, arrived from Amsterdam. Several private owners made their way by air to the sea, among them being Mr. R. Denman, a director of Airwork, Ltd., who made a round of visits of seaside resorts.

Sunday.—Mr. S. B. Cliff made an early start, clearing Customs at 5 a.m. and departing in a "Desoutter" with one passenger, with the intention of reaching Naples to-day. Mr. Ahlers left again for Amsterdam, with one passenger; Mr. Ince to Berck with one passenger on G-AAFD ("Widgeon"). Banco had a charter to Cannes, with two passengers, a "Puss Moth" leaving about midday, and Airworks also fulfilled a charter to Sandwich (for golf) and to Norfolk. An Airwork "Puss Moth" left for Le Havre, on behalf of Banco, to fetch a passenger back to Croydon. Miss Paddy Naismith carried out a most successful first solo. Heston Verandah presented quite a crowded appearance this afternoon, as, in addition to having a good sprinkling of the general public, two Motor Cycling Clubs sent parties to view the Airport, both on the ground and in the air; the two clubs were the Greenwich Motor Cycling Club and the Ditton Motor Cycling Club.

The latest news received from Misr-Airwork, the associated company of Airwork, Ltd., at Almaza Aerodrome, Cairo, was on July 26, on which date they had over 60 pupils under instruction, six flying solo and two ready for their "A" licences. Misr-Airwork have three machines for instructional work, and have just asked for an additional one.

BRISTOL AIRPORT

JUST over two years ago when the Bristol Airport was opened five machines were permanently maintained at that aerodrome. To-day the number is fifteen, which is not really a startling figure, but at any rate shows a reasonable increase for times of financial difficulty. These fifteen aeroplanes are in actual operation, either by the Club, private owners, the sales organisation or the air taxi service, and are quite apart from a steady flow of "outsiders" who arrive at the Airwork Bristol Branch for major or minor overhaul. Since December of last year Airwork of Bristol have had considerably more than their fair share of work. At present they are as busy as ever, and there must have been constant calls to Heston for reinforcements in the matter of personnel. On the sales side, Norman Edgar & Co. have given several demonstrations at Bristol and elsewhere with a new Puss Moth which they have recently taken into stock. Mr. Edgar flew a Puss Moth from Bristol to Paris on Bank Holiday Monday, with Mr. Percy Lister, of R. A. Lister & Co., Ltd., as a passenger. The return journey was made direct from Le Bourget to Bristol Airport for Customs clearance, in the good time of three hours twenty-five minutes. Last week Norman Edgar & Co. sold two aircraft engines to Australian customers—a geared Cherub to Queensland and a Blackburne Thrush to Melbourne. It appears that both purchasers intend building their own aeroplanes around the engines in question. The Bristol and Wessex Aeroplane Club instructors have had plenty to do with new pupils and old timers taking refresher courses. The Club annual garden party and flying display is to be held on Saturday, October 1. This event will conclude with a dinner and dance, and, as usual, all who arrive at the Airport by air on this day will be the guests of the Club at the dinner and dance in the evening. It is also hoped that one of the Imperial Airways "Heracles" class will travel to Bristol on October 1 for joy-riding purposes, and any intending visitors to Bristol on this day can travel by this aeroplane from Croydon at the reasonable fare of £2 for the single journey or £3 16s. return. Applications for seats in this aeroplane for the London and Bristol journey should be made to the Manager, Bristol Airport, Bristol.

Spain's Flying Corps

SENOR AZANA, the Spanish Premier, has announced that the expenditure on the Flying Corps will be increased within the next five years from £320,000 a year to £6,000,000.

France's Bombers

THE Paris correspondent of *The Times* denies a report that the French Air Minister is about to disband the bombing squadrons or to transfer them to other branches in the guise of long-distance reconnaissance machines.

Congratulations

M. ANDRÉ FRACHET, Assistant Editor of our excellent French contemporary *Les Ailes*, was married on July 28 to Madame Simone Bennett. M. Frachet and his Chief, M. Georges Houard, have always dealt liberally with British aviation, and believe in giving credit where credit is due, and the British aviation community will, we feel sure, join us in wishing M. Frachet every happiness in his married life.

Aerodromes in Travancore

PROVISION for the construction of two aerodromes in Travancore, one of the largest States in South India, will be made in the next year's budget by the Durbar. One will be situated in Trivandrum, the capital, and the other in Quilon. The costs will be Rs. 15,00,000 and Rs. 20,000 respectively.

Aerodromes in Nyasaland

AN aerodrome has been laid out at Namwera by Mr. N. S. R. Broadhurst, of Wamitunda Estate, Namwera, Nyasaland. It lies on the route from Dar-Es-Salaam to Salisbury, Rhodesia, and should therefore prove useful to travellers between these points. It is 16 air miles N.N.E. from Fort Johnston, which is at the southern end of Lake Nyasa.

The field has a good surface and is 150 yards wide by 600 yards long. The long direction is that of the prevailing wind which is practically constant. Mr. Broadhurst states that the trip from Salisbury to Dar-Es-Salaam is, as a rule, too long for one hop, and that he will be glad to welcome anyone who drops in. Supplies of petrol are always available.

A white circle and wind stocking indicate the aerodrome which is just under the north slope of Mangoche Mountain (5,500 ft.). There are a number of other landing grounds in the district, but none are very good. Limbe is the principal airport of Nyasaland, but is small and rather rough, and a new one is being constructed at Blantyre. There are landing places at which pilots can alight safely at Balakas, Dedza, Lilongwe, Fort Jameson, Fort Johnston, and Namwera.

Appreciation

THE H.G. Hawker Engineering Co., Ltd., inform us that they have received from General Neditch, the Officer Commanding the Royal Yugoslavian Air Force, a communication congratulating them on the remarkable qualities of the "Fury" single-seater fighter and its Rolls-Royce "Kestrel" engine which enabled his service to win the competition for single-seaters at the Zürich International Meeting.

No. 45 Squadron Reunion Dinner

THE reunion dinner of No. 45 Squadron, R.F.C. and R.A.F., will be held on September 24 at 8 p.m. at the Overseas League Clubhouse, Vernon House, Park Place, London. Full evening dress and decorations will be worn.

AIRISMS FROM THE FOUR WINDS

Mollison's Atlantic Bid

ON August 4 Mr. J. A. Mollison received delivery of his D.H. "Puss Moth," *Heart's Content*, which has been specially equipped for his attempt on the double Atlantic crossing. He had intended leaving Stag Lane aerodrome for Baldonnel, Ireland, almost immediately, but some last-minute adjustments were decided upon, including the strengthening of the tail skid and the discarding of the wireless and direction-finding apparatus. It seems a pity that so many Atlantic (or other big over-sea) flyers decide, at the last minute, to discard such very necessary gear, which can only add to the already unnecessary risk attached to ventures of this nature. However, preceded by his wife (Mrs. Amy "Jo-llison") in her own "Moth," he left Stag Lane for Ireland on Tuesday evening. He proposes to leave Baldonnel at dawn on the first suitable opportunity, or on August 16, when he can take advantage of the full moon. His course will lie over the great circle, making for northern Newfoundland, thence via Harbour Grace to New York. Then, after refuelling, overhauls, and a few hours' sleep, Mr. Mollison proposes to start on the return journey to Croydon Airport.

FOR THE DOUBLE ATLANTIC ATTEMPT: Mr. Mollison has had his "Puss Moth" equipped with extra tanks for this flight. He will sit much farther back in the cabin than usual, with a 75-gallon tank in front of him, a 45-gallon tank behind him and a 20-gallon tank in each wing. (FLIGHT *Photo.*)

Mrs. Bruce Fails Again

FATE has been unkind to the Hon. Mrs. Victor Bruce, who is attempting to carry out an endurance flight of about four weeks in her Saro "Windhover" (three "Gipsy II"), *City of Portsmouth*. As recorded last week, she was forced to descend after two hours' flying on the first attempt on August 1 in order to make certain electrical and other adjustments. These having been effected, the *City of Portsmouth* carried out successful refuelling tests over the Portsmouth area on August 4. Next day a second attempt on the endurance record started at 2.12 p.m. from the Solent. Certain changes in the crew had been made, Flt. Sergt. W. R. McCleery taking the place of the Hon. Mr. Victor Bruce, who will be in charge of the refuelling Bristol Fighter. This change was made because McCleery has considerable experience in night flying. By dusk three refuellings had been carried out successfully, and it was planned to make contact again at dawn the following day. During the night, however, they encountered thick fog over the Channel, which still prevailed when daylight came, and by 6 a.m. they found themselves running short of fuel and unable to make contact with the refuelling machines. They eventually alighted off Ventnor, after having been in the air about 15 hr. 40 min. A third attempt started on August 9, the *City of Portsmouth* taking off from Cowes with a small supply of fuel, and immediately refuelling in the air over Southsea. A course was then set for Ipswich, where it has been decided to establish a refuelling base in order to avoid further interference from fog.

FLYING HOME: Lt. Com. G. A. Hall, of the Royal Australian Navy, about to leave Croydon for Australia in a Blackburn "Bluebird" ("Hermes II") on August 8. He has been doing duty in England on an Aircraft Carrier, and is now flying back "away under" in easy stages, without any intention of beating records for the journey. (FLIGHT *Photo.*)

Aero Industry in Portugal

By

LESLIE H. HOWARD

A "JUPITER" ON TEST: View of the torque-reaction test bench at Alverca. The Bristol "Jupiter" engines are built in Portugal under licence.

NO private organisation for the construction of aircraft or aero-engines exists in Portugal. Indeed, aviation is limited, for all practical purposes, to the Military and Naval Air Forces. Civil aviation is yet an aspiration, there being not more than three or four civil and commercial aeroplanes in the country. One is a D.H. "Moth" ("Gipsy I," 80-h.p. engine), belonging to the Aero Club de Portugal. Another is a privately-owned craft, a D.H. "Moth" ("Gipsy II," 120-h.p. engine), belonging to a member of the Aero Club. The third machine is a Farman 190 (230-h.p. Salmson engine), owned by the Companhia Portugueza de Aviaçao, which is the Luso-French concern holding the monopoly of air transport in Portugal and her colonies and possessions. The fourth machine is a B.F.W. M.18c monoplane, fitted with a 125-h.p. Walter engine, and is the property of an aerial survey concern recently established.

Therefore, at the moment there is no scope for aeronautical construction as a private enterprise.

The workshops of the Military Aeronautical Force, known as the Oficinas Gerais de Material Aeronautico (The General Aeronautical Material Workshops), situated at the Alverca Aerodrome, which, by the way, is the International Landing Ground for all aircraft visiting Portugal, produce aircraft and aero-engines under licence.

The manufacture of the famous and ubiquitous Bristol "Jupiter" is carried out under the direction of Monsieur Charles le Gac, a French engineer of the Société des Moteurs Gnome & Rhone, holders of the Bristol licence. M. le Gac has been at Alverca for just over three years, and has developed the workshops from a mere project until now it is a very efficient plant. The production figures are not high, and one is not permitted to state the number of engines made, modified and now under construction. They are not numerous, but they leave nothing to be desired in the way of finish and performance. The workmen are civilians, and some Sergeant-Mechanics of the Portuguese Military Aeronautical Force are charge-hands and foremen.

The workshops are very well equipped, and are adequate for the volume of work they are called upon to handle. A careful system of checking and testing, under the supervision of Engineer-Officers of the Aeronautica Militar, together with an elaborate costing system, is employed.

Work is inclined to be spasmodic, because the annual and supplementary grants to the Aeronautica Militar are not sufficiently large to permit of constant and continuous working, although a *cadre* is always maintained.

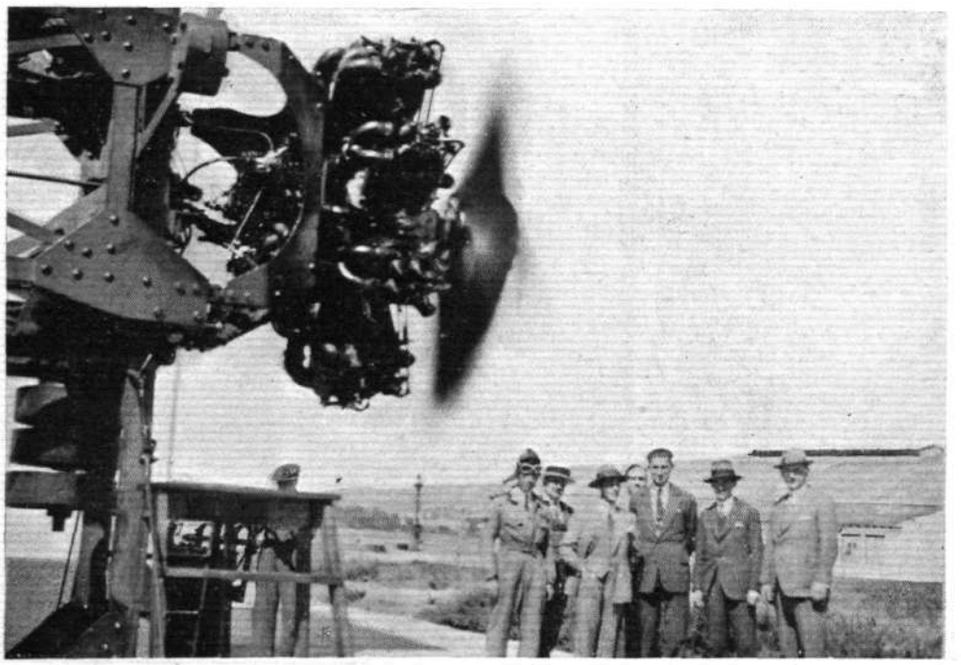
The testing of the engines after constructions is carried out under the direction of Monsieur Réné Lapray, also an engineer of the Gnome-Rhone Company. M. Lapray has put up a torque-reaction testing apparatus which is quite one of the most modern and up-to-date apparata of its kind in existence, he having incorporated many ingenious devices of his own adaptation (if not invention) not found on normal test-benches.

One learns that an engine constructed at Alverca costs no more than the imported engine, although of course in a military establishment overheads and on-costs are not of such importance as they would be in an industrial concern of a non-military character.

Alverca also possesses an efficient workshop for wooden wing construction, and another for the manufacture of wooden airscrews. Airscrews are supplied to the Military and the Naval Air Forces.

As regards aircraft, several types are constructed under licence, the most notable being Potez XXV, of which a fair number have been built during the last two years. Vickers "Valparaisos" embodying modifications bringing them more up to date are also built. Replacements and repairs are carried out at Alverca, and the standard of workmanship is very high, particularly when it must be remembered that the Portuguese are not exactly a mechanically-inclined race.

The majority of the engines in the aeroplanes of the Military Air Force are Bristol "Jupiters" and all of this make have either been totally constructed at Alverca, or else part constructed from parts imported in the rough and machined up and assembled in the Alverca workshops.



***INTERESTED ONLOOKERS:* The tall figure in this group is that of M. Réné Lapray, the Gnome-Rhone engineer. On his left is M. Charles le Gac.**

The Naval Air Force does not construct engines or aeroplanes, but it carries out its own repairs when these are not of a major character.

There seems to be no reason to suppose that aeronautical construction will ever be undertaken on a large scale in Portugal, and in any case the French have the monopoly, should they care to take advantage of it to the extent of starting up a factory in the country. The volume of aerial traffic is very small, and, as already suggested, civil and commercial aviation hardly exist—only one commercial transport machine existing at present in the whole country. This aircraft carries out occasional joy-ride flights, but this cannot be a very lucrative business for the owners as lack of facilities and a spirit of "air-mindedness" do not permit of extensive operating.

PORTUGUESE-BUILT: A Potez XXV with "Jupiter" engine, both entirely constructed in the Alverca workshops.

The one and only civil aerodrome is over twenty miles from Lisbon, and it is badly served by rail and/or road transport. None too frequent slow "local" trains take one hour and five minutes on the journey from Lisbon to the aerodrome, but this time can be improved on by one possessing (or hiring) an automobile.

A few years back there did exist a somewhat desultory and spasmodic passenger and mail service between Lisbon and Madrid, and also Lisbon-Seville. This was run by the Junkers concern, but the refusal of the Spanish Government to continue the subsidy led to the Portuguese section being abandoned.

Therefore, it will be seen that there is no real need for a national aeronautical industry: that may come in time.

More Economy

THE Air Council has sent a letter to all R.A.F. commands to emphasise again the need for economy. Despite the economies effected last year, the Government has decided that an intensified effort must be made to secure a further reduction in the cost of administering public services. Every possible avenue of further saving is to be continuously explored, though, of course, nothing is to be done to make flying less safe. Records of doubtful value are to be abolished and likewise the reduplication of forms. A report on the steps taken is called for not later than October 1.

"Cutty Sark" Strikes a Snag

THE "Cutty Sark" amphibian belonging to the Isle of Man Air Service struck a submerged object while taxying in front of Douglas on August 7, and tore a hole in her hull. A speed-boat took off the passengers and the "Cutty Sark" was towed ashore. After the water had been drained from the hull, the pilot flew the machine to Ronaldshay aerodrome.

LONDON-ZURICH-LONDON: The first long flight of the first Stieger S.T.4 Monospar machine after getting its Certificate of Airworthiness was to Zürich during the meeting held there. In Switzerland and Italy the machine aroused a great deal of interest. Flt. Lt. Schofield, who piloted the machine, reports that he had no trouble whatever, and the two Pobjoy "R" engines ran faultlessly. Mr. Schofield was kept busy, while at Zürich, demonstrating the S.T.4. It was unfortunate that his visit took place too late for him to take part in the international contests. (FLIGHT *Photo.*)

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

HIGH-SPEED FIGURE OF "GULL"

[2803] I have from the very first been an admirer of the Percival "Gull," and nobody would want to dispute its clean layout, but I should like to be so bold as to contradict your statement that its high-speed figure of 27 is the highest known so far. It is certainly a good value, but there are aeroplanes which score even higher. Take the Lockheed machines, which I regard as the cleanest design anybody has produced yet. The "Orion" as used by the "Swissair" is supposed to do 225 m.p.h. with an engine of 580 b.h.p. and a total wing area of 275 sq. ft. This works out at nearly 37.

Now there is the case of the Supermarine S.6B, which, you say, has a lower H.S.F. than the "Gull." Assuming the b.h.p. to be 2,300 and taking the maximum speed it is capable of as 407 m.p.h., and also assuming the "6" to have a lower aspect-ratio, but the same area, as the "Gull," their H.S.F.'s are proportional to $\frac{V^3}{\text{B.H.P.,}}$ and these are for "Gull" and "6" respectively: $\frac{145^3}{130}$ and $\frac{407^3}{2{,}300}$ or 1.25 : 1, which gives the Supermarine a value of 34.75, say 35.

The assumption regarding wing area may not be correct; if the area is larger, the H.S.F. will go up, but it can come down to 133 sq. ft. and bring the H.S.F. to 27, like the "Gull's." I am unfortunately without reference books of any kind, and am prepared to be found wrongly informed.

There is also the small matter of landing speed. Having been brought up on the rule that wing loading and maximum lift coefficient determine landing speed, while high- or low-wing arrangement influence it only to some 3 m.p.h. and aerodynamical cleanness does not make any difference, I am rather at a loss with a figure like 42 m.p.h. The wing loading of the "Gull" is reasonable, but on the high side, and taking $K_{L\,max} = 0.8$ to allow for a high-lift section and an area of 180 sq. ft. to account for fuselage lift, we get:

$$V_{MIN} = \sqrt{\frac{196}{K_L} \times \frac{W}{A}} \quad \left(\frac{W}{A} = \frac{2{,}050}{180} = 11.3 \text{ lbs /sq. ft.}\right)$$

$$= \sqrt{\frac{196}{0{\cdot}8} \times 11{\cdot}3}$$

$$= 52{\cdot}5 \text{ M.P.H.}$$

Allowing for the odd 3 m.p.h., the job being of the low-wing type, the landing speed, looked upon with a very kindly eye indeed, is somewhere near 50 m.p.h. If it is not, I shall be very glad to be convinced of my mistake, but at present I cannot see where it comes in.

This question of landing speed is a curious one indeed. Some time ago I made out a list of aeroplanes produced in various countries, and found that some manufacturers, mostly in the States, underestimate their stalling speed to the extent of 20 m.p.h. or so. The Vickers Intercepter lands on paper at 63 m.p.h., but works out by calculation at 75 m.p.h., and anybody who has seen it land has felt like saying unkind things about it.

I trust Mr. Edgar Percival will not think that I am trying to be equally unkind about his machine, for I am of the opinion that it is very fine indeed. These notes were put down out of pure interest, and I hope someone will come along and clear them up.

The Hague, August 3, 1932. J. VAN HATTUM.

[Our correspondent appears to be perfectly justified in his claim that the Lockheed "Orion" has a higher value of the "High-speed Figure" than the Percival "Gull." The two machines are not, however, comparable in that the "Orion" has a retractable undercarriage. That this should result in a large increase in the value of $\frac{\eta}{2k_D}$ is only natural. In a "clean" aeroplane the undercarriage drag is a large percentage of the total. Quite likely, if the "Gull" had a retractable undercarriage, its "High-speed Figure" would be as good as that of the "Orion."

When he comes to the Schneider machines we fear our correspondent has his facts slightly wrong. The wing area of the Supermarine was 145 sq. ft., and not 169 sq. ft., as in the "Gull." The ratio of wing area to maximum horse-power of the S.6 was $\frac{145}{2{,}300} = 0.06$. The ratio $\frac{V^3}{147{,}000}$ (at 407 m.p.h.) works out at about 459, and if that is multiplied by 0.06, the result is 27.5 approximately, and not 35 as calculated by our correspondent. We must plead guilty to using somewhat ambiguous language in stating that the "High-speed Figure" of the "Gull" was "even slightly higher than that for the Schneider machines." What we really meant was that the minimum drag coefficient appeared to be slightly lower, since the higher the propeller efficiency the greater the drag coefficient. The Supermarine S.6 was, of course, designed for high speed purely and simply, and is known to have had a very high propeller efficiency. The "Gull," on the other hand, is designed for cruising, and is presumed to have its greatest propeller efficiency not at top speed, but at cruising speed, or possibly somewhere between the two speeds. Thus it is permissible to assume that it has a lower propeller efficiency at top speed than had the S.6. Actually there is so little difference in the "High-speed Figures" that the two types appear to be near enough identical in their minimum drag coefficients.

On the subject of landing speed, we sympathise with Mr. van Hattum. We also have at times been puzzled by the low figures achieved. Our correspondent should, however, distinguish between the minimum speed at which a machine will stay in the air and the horizontal speed over the ground in landing. When an aeroplane is landing, it is, of course, sinking at a rate which will vary according to the "fineness" and the wing loading. In other words, according to the gliding angle and gliding speed. We know for a fact that in the Percival "Gull" the air-speed indicator needle goes "right off the clock," as the saying is, when landed at its slowest. As the A.S.I. cannot be trusted absolutely at the lowest speed, it may be slightly in error, but the figure is certainly not far removed from 42 m.p.h.—ED.]

RISKS OF CLOUD FLYING

[2804] There usually is a considerable body of opinion which, despite official inquiries into fatal crashes, believes that it knows the real causes. There can be no question that it is necessary for aviation that accident causes must be fully investigated for the benefit of would-be survivors of flying, no less than for the quelling of unhealthy rumour.

After the Meopham disaster, rumour and uninformed opinion were rife. Various "Puss Moth" crashes have also given rise to quite unfair bias and suspicion. In respect of the most recent—that of Mr. Bossom—such suspicion will set like drying mud if a clear exposition is not made available to the interested public. It seems, therefore, in the public interest that one should put on paper a possible cause of such accidents, and couple it with a serious warning. I claim to have some considerable knowledge of cloud-flying, and, more particularly, of the behaviour of all sorts of pilots when they find themselves inside a cloud.

In a large number of cases, any one pilot will probably retain adequate control of his aircraft in a cloud, but it is equally certain that in other cases the same pilot will lose control, either after disturbance or after a given time-lapse. Loss of control often goes unrecognised by the pilot, who probably compensates for a nose-down attitude by almost sub-consciously throttling back a little, keeping r.p.m. and air speed in proper proportion. Until he emerges from the cloud he may have no idea that things have got out of hand. When he does emerge, the ground is usually seen looming deceptively close, and maybe in an unexpected quarter. The next and instinctive reaction is to pull everything hard back. This in itself may obviously set up very unfair loads, particularly if a large aileron couple is simultaneously applied to correct bank. You will note that, so far, the chain of events agrees precisely with eye-witness reports in the two cases I specifically mention above. What happens next depends on the structural abilities of the air-

craft, which are normally, of course, perfectly adequate. Coupled with the load imposed by the pilot is the practical certainty of heavy bumps immediately below the cloud. On the day of the Meopham crash the bumps were as bad as any I have met in England. On the day of Mr. Bossom's crash (on which day I did not fly) the conditions were obviously extremely bumpy.

My contention is that in both cases the primary cause of failure was temporary loss of control in blind flying—a cause which should properly be recorded in the "error of judgment" category.

The moral is this: In the course of their initial instruction all pilots should be convinced by trial that they cannot rely on their ordinary abilities in blind conditions, that to do so is to run one of the major risks of flying, and that even a fair measure of success over a series of short periods is no insurance against an accident in the long run. I do not necessarily advocate general instruction in instrument flying. As in teaching spinning, only enough instruction should be given in the first place to convince the pilot of the reality of the risk. If, after that, he elects to fly blind deliberately, he alone can assume the burden of the consequences.

There is apart from the above a tendency to take terrific risks simply because instruments are fitted. It should be emphasised that a really experienced pilot will only fly blind if he must, and then with proper trepidation. I think I have done at least 400 hours actually in cloud, and there is no one who will sooner hedgehop or turn back or land than myself in thick weather. It should be remembered that the real use of instrument flying is adjunctory to radio. Without radio it is a question for very serious consideration whether the step should be taken of turning over to instruments, unless merely for getting through a well-defined layer of cloud or in similar circumstances.

One sincerely hopes that specific warnings may be issued in some way to guard against further crashes of "blind-flying" derivation.

London. W. E. P. JOHNSON.
August 3, 1932.

BETTER VALUE FOR MONEY

[2805] Will you permit me to express my entire approval of the views expressed by Mr. Downes-Shaw in his letter [2801] published in your issue of the 5th inst.?

There is no doubt that machines could be designed for the private owner which would meet Mr. Downes-Shaw's requirements, and that such aircraft would command a ready sale once their advantages were appreciated, which would not take much time.

But it seems to be practically impossible, especially at present, to get such a type financed; in fact, experience suggests that money is much more easily attracted to the hopeless and impossible freak design than to a sound and practical proposition.

London, W. O. MANNING, F.R.Ae.S.
August 5, 1932.

BOOK REVIEWS

LEAGUE OF NATIONS BOMBERS

An International Air Force. By J. M. Spaight, C.B.E., LL.D., author of "Air Power and War Rights," etc. (Gale & Polden, 5s. net.)

One can never read Mr. Spaight quickly and easily. Every sentence which he writes requires thought and consideration. Usually, however, when he is arguing a difficult point, the way in which he marshals his facts and builds up his case makes his writing intensely interesting to read. One has to keep wide awake while one reads, but usually Mr. Spaight himself has the effect of whetting the intellect of the reader to its keenest point.

It is sometimes said that many really great barristers are only at their best when they are arguing a really difficult case. Give them a brief in a case so strong that the issue is hardly doubtful, and they may become unconvincing and even dull. So it seems to be with Mr. Spaight. The suggestion of an International Air Force, which has been put forward seriously by France at the Lausanne Disarmmament Conference, is obviously a proper subject for an international lawyer to discuss. Mr. Spaight has discussed it thoroughly. He has looked at the question from well-nigh every conceivable point of view. He has taken every suggestion which has been put forward or which could be put forward. In each case he finds insuperable difficulties. The difficulties, when he puts them forward, seem so obvious and so insuperable that one wonders why it has been necessary to consider the matter at all. Mr. Spaight, in fact, has been breaking a butterfly on the wheel. He finds so little to argue about that for once it is not very interesting to listen to his pleadings.

Yet, in spite of everything, Mr. Spaight writes that "an international air force will be seen some day, but that day will not be ours." He reiterates his belief that the force will come into being some day—to us it seems that that day will probably be the Kalends of Greece. It has occurred to less profound thinkers that there cannot be an international airman. Every member of an international force must have some nationality, and may have scruples about dropping bombs on his own country. Perhaps Mr. Spaight may have remembered the old free companies of adventurers, who would sell their swords to the highest bidder, and who rated the bargain as more binding than any claims of blood or patriotism. Perhaps the future international air force may have some resemblance to those free companies. Yet, somehow, it is not a comforting thought that our fates may lie at the mercy of aerial Dugald Dalgettys. There is rather more comfort to be found by considering the case of the Indian Police, which is in a way an international force. It recruits both Hindus and Mussulmans, and in the Punjab it recruits Sikhs, too. Yet when religious riots take place, the police force never hesitates to do its duty, and uses its *lathis* without undue discrimination on the heads of co-religionists and others. The Indian police are animated by loyalty to the *Raj* as well as to their engagement, but above all they are loyal to officers who are neither Hindus nor Mussulmans, and are quite impartial. Perhaps we may in the future visualise a body of airmen who are whole-heartedly loyal to the League of Nations—but how are we to find the neutral and impartial officers?

F. A. DE V. R.

Flights for Indian Workmen

THE Delhi cloth mills are giving free flights in aircraft belonging to the Delhi Flying Club to the workmen who produce most cloth in a given time. The question is: will Ram Baksh look on a flight as a reward or a penalty?

A Gallant Pilot Honoured

FLT. LT. E. W. BOUAR, of the R.A.F. Reserve and Northern Air Transport, Ltd., has been awarded the medal of the British Empire by the King for rescuing a pilot from a burning aeroplane at Barton in May. Bouar unfastened the pilot's harness and dragged him from the blazing cockpit, but the man died in hospital a fortnight later.

Italian Air and Naval Manœuvres

NAVAL manœuvres by 100 Italian warships are taking place in the Mediterranean between Italy and Tripoli. Twenty-three naval air squadrons are also engaged. The King of Italy is attending the manœuvres in his yacht.

General Nobile in Russia

GENERAL AMBERTO NOBILE is now Deputy Chief of Soviet Airship Construction. An airship of 6,500 cubic metres of gas, which will carry 12 persons and a ton of freight, has been built under his supervision at Leningrad. Gen. Nobile will command the airship on her trial flight to Moscow.

Flying Instructors

FROM the beginning of next year no person who has not had his licence endorsed by the Air Minister as a qualified instructor will be allowed to teach flying for a fee. It is expected that certificates issued to instructors by the Guild of Air Pilots and Air Navigators and by certain approved schools will be accepted by the Air Ministry.

LUBRICATION FALLACIES, FADS AND FANCIES

By E. C. BROWN

CONSIDERING the prime importance of lubricating oil, it is unfortunate that those who are brought into close association with it should not have greater facilities for studying its peculiarities.

The many kinds of lubricating oils can be classified as animal oils, vegetable oils and mineral oils, but it is with the latter that the engineer in these days comes mostly into contact. Mineral oils, when pure, consist only of the two elements hydrogen and carbon, thus differing from the animal and vegetable oils, by containing no oxygen, and having very little affinity for oxygen under ordinary conditions. In consequence of this, they have little tendency to dry or gum up, and maintain their original qualities for a much longer time.

A knowledge of some of the main physical properties of mineral oils is useful in order to determine the suitability of a lubricant for a particular job, but working conditions differ to such a vast extent that it is by far the safest plan on the whole to consult the lubricating oil manufacturers when seeking advice of this nature. Certain technical terms, however, are freely used without their meaning and application being fully appreciated.

Knowing the *gravity* of an oil is of little use. To the experienced oil man it reveals fairly accurately what finished products can be made up from the crude, and from what field the oil was secured, but standing alone it is of no assistance in determining the lubricating value.

Another term frequently used without a realisation of its uselessness is flash-point. The flash-test was developed to determine the fire hazard involved in the shipment and storage of oil. It indicates fairly accurately the comparative inflammability of oils under atmospheric conditions, but as lubricating oils will not flash or burn spontaneously until they are heated far in excess of their fire-point, a knowledge of these figures has little value for ordinary commercial purposes.

We now come to *viscosity*. Everyone knows that some oils will flow out of a can more quickly than others, and that when rubbed between the fingers one oil will rub out more quickly than the other. In the case of the oil flowing out of the can, the force is that of gravity ; when rubbing the oil between the fingers, the force is the pressure applied by the fingers. Oils which have the greatest internal resistance are moved by gravity the most slowly, in other words, they flow out of the can less quickly. They resist any change in position, and are less easily squeezed from between bearing surfaces.

This resistance is called viscosity, and is the property of a lubricating oil which enables it to hold two bearing surfaces apart, even under heavy loads, thereby preventing metallic contact and consequent wear.

Viscosity is influenced by changes in temperature. When oil is heated, it grows thinner, and when cooled it becomes thicker, but few people realise that all other liquids do likewise. Water at 190 deg. F. is less than one-fourth as viscous as it is at 50 deg. F. The reason that this difference is more noticeable in oils is that oils are much more viscous to start with, and also the rate of change of viscosity with temperature changes is more rapid.

It is therefore important to determine the actual operating temperature range, and to select the lubricating oil which will have the correct viscosity within that range. It is quite a common saying that an oil looks too thin. This fact, however, has not the slightest significance. What the engineer wants are the figures giving the viscosity of the oil at the working temperature of his engine, and also the lowest temperature to which the oil is likely to be subjected. The thickest oil is by no means necessarily the one which will remain so under heat.

The cold-test has been dropped in favour of the pour-point, which can be defined as " the lowest temperature at which an oil will pour or flow, when it is chilled without disturbance under certain specified conditions."

We now come to the *bête-noir* of all engineers—carbon deposit. Petroleum oils contain the element carbon combined chemically with hydrogen, in varying amounts, the average percentage in lubricating oils being about 85, so that as long as oils are used for lubrication, there will always be carbon to contend with.

It is not so much the amount of carbon in the oil which causes the troublesome deposits, but its tendency to separate. If the separated carbon was dry, it would be carried away, but since it is usually partly combined with oil, it sticks and forms a gummy mass.

The ideal oil would form a film on the cylinder walls thick enough to prevent complete destruction on the explosion and exhaust strokes, and would evaporate cleanly without decomposition from the cylinder head and valves when it had completed its work.

A " straight " mineral oil will evaporate more cleanly and with the formation of less carbon deposits than a blended oil. The reason for this is that the " straight " oil is composed of compounds having their boiling points fairly close together. When the temperature becomes high enough to evaporate any part of the oil, practically all of it goes off together. A compounded oil, on the other hand, being compounded of ingredients of both low and high boiling points, loses that part which evaporates at low temperatures, the high portion remaining unevaporated, until, if exposed to a high temperature long enough, it will decompose and form carbon.

One of the greatest sources of carbon trouble is too much oil. The oil may be of the very highest quality, and entirely suited to the job, yet it will cause trouble when more is supplied than can get out of the cylinder before decomposition takes place. Obviously the remedy should be to cut down the oil feed.

The influence of fuel on carbon deposit is very rarely taken into sufficient consideration. When incomplete combustion takes place, soot is formed. If a thick film of oil is present on top of the piston or in the combustion chamber, the soot, when blown against it, sticks and lays the foundation of a fine deposit. More oil working past the rings collects more soot, and the deposit builds up rapidly. More carbon deposits are due to incomplete combustion than to all other causes combined.

Dilution is another state of affairs for which the oil is usually blamed. Should liquid fuel reach the cylinder on the suction stroke, part of it vaporises on coming into contact with the warm cylinder wall. The liquid fuel and the lubricating oil are, of course, mutually soluble. The absorption of the liquid fuel, which is of low viscosity, reduces the viscosity of the oil. When liquid fuel enters the cylinder in some quantity, as in the case of starting up a cold engine by priming, it runs down into the crankcase in a liquid state, washing the lubricating oil film from the cylinder walls on its way. Over-priming, therefore, is one of the chief causes of dilution.

When the liquid fuel and the thinned oil from the cylinder get into the crankcase, they reduce the viscosity of the entire quantity of oil. Petrol is lower in viscosity even than water, and it requires only a very small quantity to thin out the oil seriously. A half-pint of petrol used in priming will do more damage to the oil than a month of running under ordinary conditions.

Dilution may also occur by running the engine over-rich, by the use of a low-grade petrol, by over-cooling the engine or by a series of short runs without allowing it to warm up.

An improvement in lubrication impaired thus by fuel absorption can be sometimes secured by raising the temperature of the circulating water. This raises the cylinder temperature, improves the evaporation and combustion.

The air-cooled engine, because of its relatively high cylinder temperatures, evaporates a greater percentage of the liquid fuel reaching the cylinder, and consequently there is less dilution.

It is known, however, that very high temperatures will destroy the oil, causing it to break down forming carbon, and that the viscosity is lowered as the temperature rises. It will be seen, therefore, that correct adjustment of the temperature also plays a very important part, and can be frequently held responsible for defects which are usually attributed to the quality of the oil.

The object, then, of the foregoing has been an endeavour to remove the tendency of looking upon oil as a necessary evil, which is to be blamed automatically for everything that goes wrong.

In actual practice, provided that the engineer insists upon using an oil of good quality, and one which has been recommended by a manufacturer of repute as being suitable for the job, he can cease from allowing his imagination to run riot concerning trouble directly attributable to the oil.

THE INDUSTRY

"EXPANDABLE" BUILDINGS

The difficulty of foreseeing future requirements is not peculiar to the aviation industry. It is, in fact, an ever-present problem in all branches of industry, and has caused the designers (or should one say inventors?) of "elastic" buildings to cudgel their brains for really practical solutions.

Among the latest and most ingenious of "expandable" building systems is the "Boyes," which bears the name of a figure familiar in aviation for many years, Mr. G. E. F. Boyes, who was once upon a time associated with National Flying Services, and who previously served in the R.A.F.

The "Boyes" type of "expandable" buildings makes use of the well-known Lewis dovetailed steel sheeting, in which the corrugations are of what may be roughly described as dovetail shape, instead of the more gently curved wave forms of ordinary corrugated sheet metal. During manufacture of the sheets the corrugations are given sufficient taper to enable those of one sheet to slide into the ends of those of the next sheet. In this way a very good joint is made between adjoining sheets without any reinforcement.

After being galvanised this material is assembled on the "Boyes" principle into standard sections of 8 ft. each. Units have been standardised which, for transport purposes, measure only 8 ft. 6 in. by 9 ft. 9 in. The buildings can be erected by unskilled labour under the supervision of one or two skilled men.

The walls of the "Boyes" buildings are built on the "bowstring" principle, with covering of Lewis dovetail sheeting. The hollow construction prevents the buildings from becoming excessively hot in summer and uncomfortably cold in winter.

For aircraft hangars clear floor space is a major consideration, and as an example of the range of possibilities the design of a hangar has been completed, with a clear floor space of 150 ft. by 300 ft. and with a height (clear) of 50 ft. This by no means marks the limits of possible size. At the other end of the scale, it is possible to construct on the "Boyes" principle, and from standard units, a small lock-up for a light plane.

Further particulars, prices, etc., may be obtained from Boyes Expandable Buildings, 61, Cheapside, London, E.C.2 (Telephone Central 8668), mentioning FLIGHT.

HEAT RESISTING PAINT FOR EXHAUST MANIFOLDS

AN entirely new development in the painting of engine parts is the discovery of a new paint, known as "Kemick" Heat-Resisting Paint, which is at once a rust-preventative and actually improved by intermittent heating and cooling action.

Until now there has been no known material which could be satisfactorily applied to exhaust systems to preserve them from rust for any appreciable length of time. However clean the other parts of an engine, the effect is spoilt by the rusty and dirty surface of the exhaust system. "Kemick," it is claimed, will give this an appearance as good as the rest. It will not come off or burn off hot metal at red or even white heat, and its efficiency as a rust-preventative is in no way lessened at these extreme temperatures.

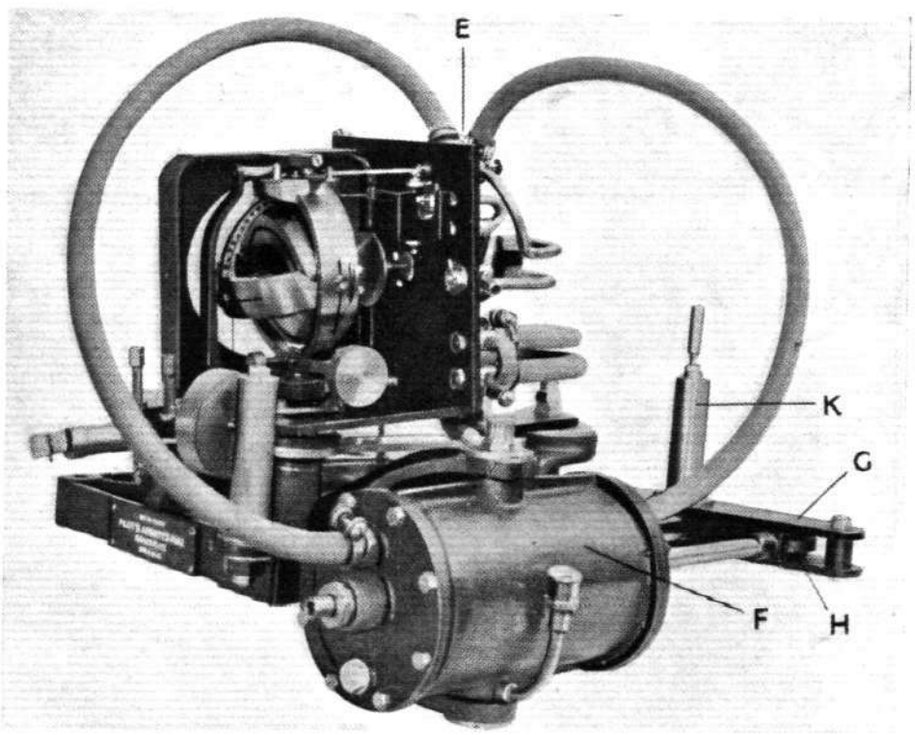
"Kemick" is a paint with a liquid and volatile content which serves to spread the material evenly on the surface and hold the pigment in place before heating. Moreover, heat which decomposes ordinary paint to worthless ashes, changes "Kemick" by a chemical process into a finish which will adhere to the surface and prevent rust for an indefinite period. It retains its colour at all times. When applied it is black, but when heated it bubbles slightly and liberates a fine white powder which, mixed with the black pigment, gives the surface a dark grey colour. It requires no skill in application, and the surface to which it is applied need not be as clean and polished as would be required for an ordinary enamel, although all old paint, oil, grease and loose scaly rust should be removed with a wire brush or sandpaper. Two coats of "Kemick" are recommended and it is advisable, where possible, to heat the surface after the first coat and before the second is applied.

"Kemick" is equally satisfactory on steel, iron, zinc, galvanised iron, copper, brass, tin or aluminium.

The manufacturers of this new product are Nobel Chemical Finishes, Ltd. (associated with I.C.I.), of Slough, Bucks.

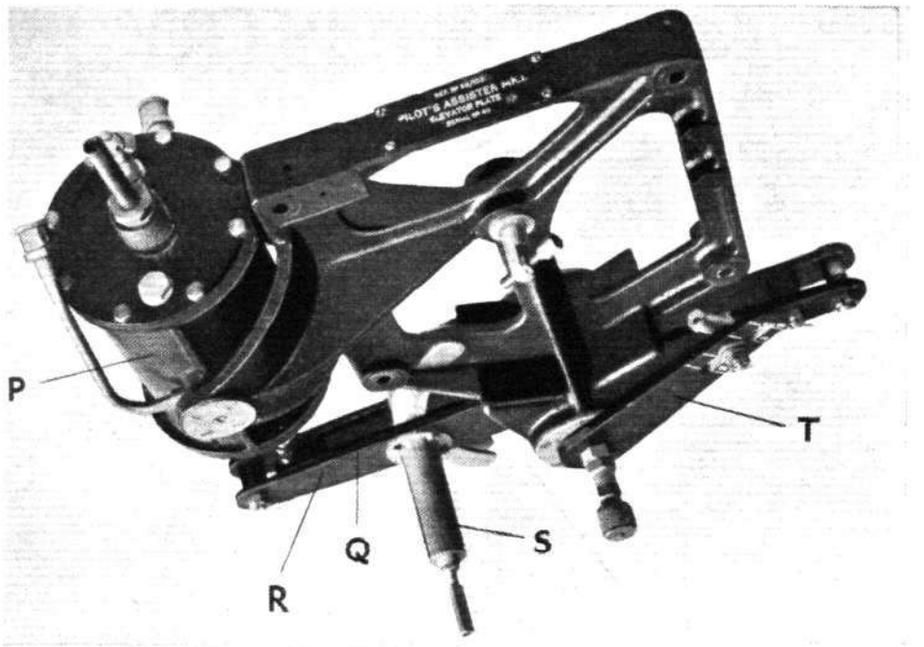
THE AUTOMATIC PILOT

ANY instrument which relieves the pilots, particularly those of large commercial aircraft, of the strain of flying will naturally receive great attention. One of the latest of these is the Smith Automatic Control, which is a device for controlling an aircraft on a pre-set course without human aid. By means of gyroscopic axis and through the medium of a sensitive relief valve, this control corrects the slightest deviation from the attitude defined by the gyroscope with a far greater promptitude and precision than is possible by any human means. This control is extremely sensitive, and no matter what the atmospheric conditions, it is claimed that it will detect and correct a deviation not only far more quickly than will a pilot, but quicker than the usual flying instruments can show that deviation. This, of course, makes navigation through clouds or conditions of very bad visibility much safer than when the pilot has to rely solely on the usual flying instruments. Instrument flying is certainly a form of piloting with which everyone should be familiar, but it is undoubtedly a strain when undertaken for long periods, and it is just this strain which the Smith Automatic Control is designed to obviate. It is also of great value in cases like those where the flying must be extremely accurate, as for example on survey work. This automatic control maintains the aircraft on a given course by mechanism which exercises the control of the rudder and elevators. The movement of a gyroscope is employed to operate two piston valves which control operating cylinders worked by compressed air, and these cylinders in turn operate the controls restoring the aircraft to its pre-determined position. In the illustration showing the rudder plate, the gyro rotor is carried



The "Rudder Control Plate" of the Smith Automatic Pilot.

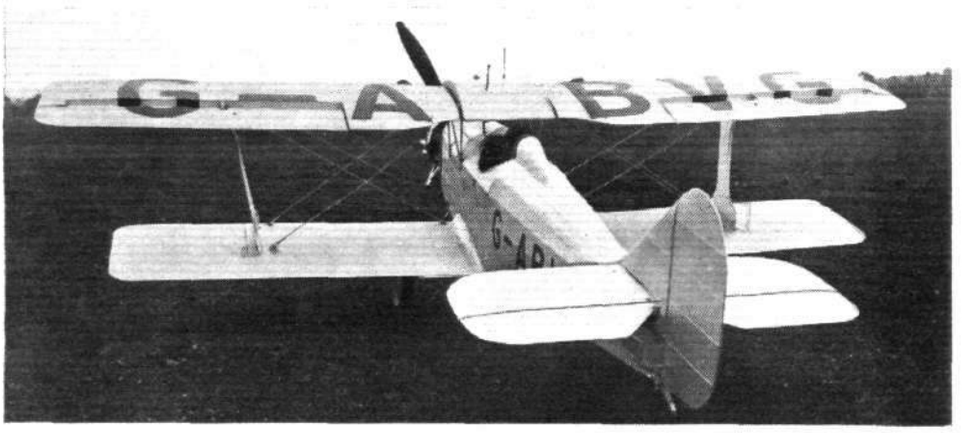
in ball bearings in a horizontal gimbal ring. This gimbal ring is mounted in a vertical ring on pivots set at right angles to the rudder axis. The vertical ring is in turn mounted on pivots in the frame. The gyro rotor is driven by a supply of compressed air led, via a filter, through the bottom pivot to a jet playing on buckets cut in its periphery. The movement of the rotor is controlled by the small piston valve (E) from which flexible pipes are led to the servo motor (F). The servo motor is a double acting cylinder pivoted about a vertical axis, and the piston rod is connected to the dummy rudder bar (G) which is connected to the aircraft rudder control. A means of cutting out the automatic control in emergency is provided by duplicating the lever (G) with the lever (H). These two are normally locked together by a spring-loaded plunger (K) actuated from the Bowden cable through a lever in the pilot's cockpit. The elevator control plate carries the servo motor (P) similar to that on the rudder plate. The lever (Q) is connected to the piston rod and the lever (R) to the aircraft elevator control. These levers may be independent in action, or they may be locked together by a plunger (S) in the same way as on the rudder control plate. A valve follow-up system is effected by means of a Bowden cable connected at one end to the elevator valve casing and at the other to the slotted lever (T), which is operated by the servo motor. The follow-up ratio can be varied by sliding the point of attachment along the slotted lever. A booklet has been prepared by Smiths' Aircraft Instruments, of 185, Great Portland Street, London, W.1, which describes this automatic control in far greater detail than it is possible to do in our pages. Readers who are genuinely interested in this control should write to this company for a copy, mentioning FLIGHT.



The "Elevator Control Plate" of the Smith Automatic Pilot.

A DISTINCTION WITH A DIFFERENCE

IN our issue of July 29, in referring to the "Amal" Flame Trap, it was stated that this had been approved and adopted by the Air Ministry. What we *should* have said was that the *principle* had been approved. Actually, of course, all aero engines have incorporated in their induction pipes a flame trap working on the same principle.



THE MILES "SATYR": This machine, which was illustrated last week, has now been finished and flown. Certain modifications are to be made, among them the transference of the petrol tank from the top centre-section to the fuselage. The "Satyr," as was expected, has a good take-off and a high rate of climb.

THE ROYAL AIR FORCE

London Gazette, August 2, 1932.

General Duties Branch

Pilot Officer on probation G. L. Menzies is confirmed in rank (July 11). The following Pilot Officers are promoted to rank of Flying Officer :—C. S. Moore and N. E. Morrison (June 20) ; A. H. Marsack and M. Sorsbie (July 5). F./O. J. A. H. Louden takes rank and precedence as if his appointment as Flying Officer bore date Jan. 30, 1931. Reduction takes effect from May 24, 1932. F./O. J. Mutch takes rank and precedence as if his appointment as Flying Officer bore date Jan. 28, 1931. Reduction takes effect from May 24, 1932. Wing Com. G. W. Robarts, M.C., is placed on half-pay list, Scale A (Aug. 2). Flt. Lt. J. B. Veal is transferred to Reserve, Class A (Aug. 1).

Stores Branch

The following Flying Officers on probation are confirmed in rank (April 13) : —W. H. Dyson and R. J. Williams. Flt. Lt. E. W. Lawrence is placed on retired list (July 31).

PRINCESS MARY'S ROYAL AIR FORCE NURSING SERVICE

Staff Nurse Miss G. K. Johnston resigns her appointment (Aug. 1).

ROYAL AIR FORCE RESERVE
RESERVE OF AIR FORCE OFFICERS

General Duties Branch

R. K. Rose is granted a commn. in Class A as Flying Officer (July 6). The following are granted commns. in Class AA (ii) as Pilot Officers on probation (July 19) :—J. H. Marsh, D. L. Rawnsley. The following Pilot Officers on probation are confirmed in rank :—A. B. Tucker (July 2) ; J. L. Barker (July 6), R. L. Moss (July 6), J. A. S. Hodgson (July 20).

The following are transferred from Class A to Class C.—Flt. Lt. W. A. Mackay, D.C.M. (Lt. R.A.R.O.) (July 31) ; F./O. H. C. Biard (June 19) ; F./O. H. A. A. Brosse (June 29) ; F./O. F. J. E. Feeny, D.S.O. (July 29). F./O. R. F. G. Lea resigns his commn. on appointment to a commn. in Auxiliary Air Force as Pilot Officer (July 22).

Medical Branch

Flt. Lt. D. Magrath, M.B., is transferred from Class D (ii) to Class D (i) (Sept. 24, 1930).

SPECIAL RESERVE

General Duties Branch

D. O. Young is granted a commn. as Pilot Officer on probation (June 30).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (CITY OF LONDON) (BOMBER) SQUADRON.—R. F. G. Lea is granted a commn. as Pilot Officer on resigning his commn. in Reserve of Air Force Officers (July 22).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch.

Wing Commander G. S. M. Insall, V.C., M.C., to Station H.Q., Upavon, 27.7.32. to Command vice G./Capt. E. W. Norton, D.S.C.

Squadron Leaders : C. Crawford, to Aeroplane and Armament Experimental Estabt., Martlesham Heath, 1.7.32, for armament duties vice F./Lt. C. W. M. Thompson. A. F. Lang, M.B.E., to No. 210 (F.B. Sqdn.), Pembroke Dock, 28.7.32, for flying duties vice W./Cdr. J. O. Andrews, D.S.O., M.C.

Flight Lieutenants : C. W. McK. Thompson, to No. 15 (B) Sqdn., Martlesham Heath, 1.7.32. R. Grice, D.F.C., to No. 208 (A.C.) Sqdn., Heliopolis, Egypt, 11.7.32.

Flying Officers : W. R. Hartwright, to R.A.F. Base, Gosport, 18.7.32. G. G. Barrett, to Marine Aircraft Experimental Estabt., Felixstowe, 25.7.32. D. Barclay, to No. 27 (B) Sqdn., Kohat, India, 6.7.32. C. L. Monckton, to No. 11 (B) Sqdn., Risalpur, India, 6.7.32. F. W. Yates, to No. 2 Armoured Car Co., Ramleh, Transjordan, 22.7.32. A. R. Combe, to No. 3 Flying Training Sch., Grantham, 31.7.32. W. K. Beisiegel to R.A.F. College, Cranwell, 31.7.32. S. L. Blunt, to No. 3 Flying Training Sch., Grantham, 31.7.32. P. J. H. Halahan, to R.A.F. College, Cranwell, 31.7.32. J. E. MacCullum, to No. 5 Flying Training Sch., Sealand, 31.7.32. E. J. H. F. Moreton, to Elec. & Wireless Sch., Cranwell, 31.7.32. H. G. Parker, to No. 5 Flying Training Sch., Sealand, 31.7.32. P. W. A. Dudgeon to R.A.F., Training Base, Leuchars, 31.7.32. J. A. C. Stratton, to No. 3 Flying Training Sch., Grantham, 31.7.32. A. L. Weait, to R.A.F. College, Cranwell, 31.7.32. L. F. Sinclair, to No. 5 Flying Training Sch., Sealand, 31.7.32. H. L. McCulloch, to No. 2 Flying Training Sch., Digby, 31.7.32. F. L. P. Henzell, to No. 3 Flying Training Sch., Grantham, 31.7.32.

Stores Branch.

Flying Officers : W. Macey, to R.A.F. Base, Gosport, 28.7.32. G. G. N. Marshal, M.B.E., to Station H.Q., Upper Heyford, 28.7.32. G. Thornton, M.M., to Station H.Q., Hawkinge, 28.7.32. G. R. Thwaite to Marine Aircraft Experimental Estabt., 28.7.32.

Accountant Branch.

Flight Lieutenant F. M. Hall, to No. 3 Flying Training Sch., Grantham, 25.7.32.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty :—

Commrs.—G. V. B. Faulkner and H. D. Vaughan-Hughes, to *President* for course at Air Ministry.

Lieut. P. A. Booth (F/O., R.A.F.), to *Furious*, for 466 Flight (July 31).

Flight Lieutenant C. R. Smythe, to R.A.F. Depot (July 1).

Lieut.-Comdr. (Flt. Lieut., R.A.F.).—F. W. H. Clarke, to *Glorious*, for 461 Flight, in command (July 15).

ROYAL AIR FORCE.

Flying Officer.—W. R. Hartwright, to R.A.F. Base, Gosport (July 18).

R.A.F. Electrical and Wireless School, Cranwell

THE following are extracts from the Report by the Commanding Officer, Group-Capt. R. H. Verney, at the Passing-Out Inspection of Aircraft Apprentices on July 28. 1932. The inspection was carried out by Air Vice-Marshal F. W. Bowhill, C.M.G., D.S.O.

The total entry (after allowing for changes) is 74, comprising 33 Wireless Operator Mechanics and 41 Electricians.

Discipline.—A high standard has been maintained by this Entry, though I regret to report that as regards the Aircraft Apprentices as a whole I have to complain of some lack of discipline in observing the regulations about smoking, the saluting of Officers, and lack of steadiness, *e.g.* looking about while on parade or marching at attention.

Training. Wireless Operator Mechanics.—Reports received from the various technical sections on this Entry of Aircraft Apprentices vary considerably—in Morse Signalling and Procedure they have reached a high standard, in Radio and Electrical subjects they have displayed keenness, and their attainments, though not brilliant, are well up to average. In the Workshops Sections their attainment is average, and their application fair. The standard attained in Aircraft Wiring was below average, but they are well up to standard in air operating.

The results attained at the C.T.T.B. Examination were satisfactory ; of 33 pupils examined, 5 passed out as L.A.C., 22 as A.C.1, and 6 as A.C.2.

Electricians.—The standard reached by the Electricians of this entry has been quite up to average.

The actual results obtained in the final C.T.T.B. Examination are fair—of 40 pupils examined, 4 passed out as L.A.C., 20 as A.C.1, and 16 as A.C.2. One Apprentice, absent in Hospital, has not yet been examined.

Education.—Comparatively speaking, the standard of the entry has been rather lower than usual, but sixty-two Apprentices succeeded in qualifying educationally for L.A.C., although only two candidates obtained more than 75 per cent., and only five more than 70 per cent. The average marks for the entry as a whole, 58·7 per cent., compares a little unfavourably with 60 per cent and 62·6 per cent. for the previous two Entries that have passed out. Nevertheless, the results, apart from the eleven Apprentices who failed to qualify educationally for L.A.C., have been very satisfactory indeed for the general body of candidates.

General.—In addition to the 420 Aircraft Apprentices there are Officers and Airmen under training in the School. 18 Officers and 360 Airmen at the time this Report was written.

Medical. General Health.—During the period under review the general health of the troops was very good. Other than one case of Scarlet Fever, no infectious diseases occurred.

The total number of Apprentices admitted to Hospital for the period January to June was 95, compared with 110 for the corresponding period of last year.

Instructional Developments.—(*a*) As experience had shown that the 12 Wireless Outstations situated on the road leading to Cranwell Village were inadequate for the numbers under training, the capacity for this form of instruction has been increased by converting a large lecture room into 12 internal sound-proof cubicles. These are organised as Wireless Stations, and enable the instruction and experience in handling traffic to be increased.

(*b*) By the introduction of a remotely-controlled Wireless Station we are enabled to work two aeroplanes in the air using continuous wave transmission and reception. In addition, the use of a large field as a landing ground, 4 miles from Cranwell, has been obtained, and this enables air operating to be practised in conjunction with a portable ground station without adding to the air congestion of aircraft operating near Cranwell Aerodrome.

Drill.—This refers to Aircraft Apprentices. The general standard is considered to be good.

Physical Training.—This refers to Aircraft Apprentices.

Since January, every Aircraft Apprentice has half an hour's P.T. before breakfast on one morning a week, and halt an hour in the morning or afternoon on another day, and the effects are obviously beneficial.

Games.—Refers only to " A " Squadron (Aircraft Apprentices).

Association Football.—The Squadron XI played 24 games in the Ruskington League. Of these, 16 were won, 1 was drawn, and 7 lost. Flight-Apprentice Hollingworth scored 45 goals out of the total of 108 scored by the team during the whole season. The Squadron was fourth in the League table at the conclusion of the season.

Rugby Football.—The Rugby team was less successful. 26 games were played since the beginning of the year, of which 9 were won, 2 drawn and 15 lost.

Hockey.—19 games were played, of which 11 were won, 3 were drawn and 5 lost.

Athletics.—The Apprentices Squadron obtained the highest aggregate of points in the Command Sports held at Cranwell on May 30; 1932, and were awarded the Squadron Championship Cup for the first time. The Tug-of-War Cup was also won by the " A " Squadron team which was composed entirely of apprentices.

Cricket.—Eleven matches have been played up to the present of which 7 have been won and 4 lost.

Prizes.—The winners of the Air Ministry Prizes were as under :—

Highest Aggregate Prize for the Aircraft Apprentice obtaining the highest aggregate marks in all subjects :—Sergeant-Apprentice Barsby, N.

Highest Technical Prize for the Aircraft Apprentice obtaining the highest marks in technical subjects, and *Highest Educational Prize* for the Aircraft Apprentice obtaining the highest marks in Educational Subjects :—Corporal-Apprentice Tillyard, R.

Cadetships.—No cadetships have been awarded on this occasion to aircraft apprentices passing out from the Electrical and Wireless School.

PRIVATE FLYING

(Continued from page 751)

A VETERAN: Mr. A. J. Richardson (right), who is just 70, flew his "Klemm" from Norwich to the Clermont Ferrand Meeting last month, and was awarded a Special Veteran Prize. He is shown with M. Maloy, a Commissaire of the Meeting.

A special arrangement has been made with the Cierva Autogiro Co. whereby instruction on the Autogiro is to be included in the school's regular activities. This will be at ordinary school fees, no extra charge being made for the use of this rather unconventional craft.

The lecture room has now been re-equipped, and a number of novel "gadgets" installed. The well-known model of the aerodrome, which is used to demonstrate the best method of approach, has been re-built and improved.

The repairs side is "still going strong," and a number of interesting jobs are in progress at the present time. Unfortunately this is a side of Brooklands—and we suppose of every other aerodrome—of which the public see little. Most of the praise of visitors is gathered by those who fly, and little attention is paid to the quiet, methodical way in which things go on at the workshops.

A large electric sign in the shape of the letter "R" has been set up on Vickers' sheds to remind the forgetful to make a right-hand circuit. It is visible for a considerable distance.

The Brooklands Aero Club have installed a new machine, G.ABYI, which has been painted in the club's new black and yellow colour scheme. Excellent reports have been received from all those members who have flown it, and everyone seems very pleased with its performance.

Flying hours for the week-end reached the excellent total of nearly 50 hr.

MANCHESTER-LIVERPOOL RACE

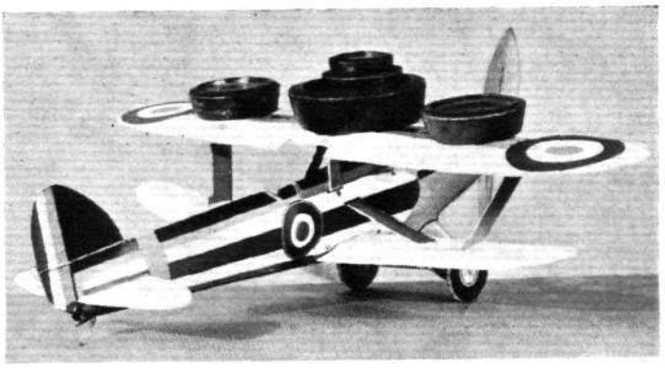
Considerable alterations have been made in the regulations for this year's Manchester-Liverpool inter-city race, which takes place on Saturday, September 3. The course is one of approximately 100 miles, and starts from Hooton aerodrome at 3 p.m. Competitors will fly *via* Huyton Hill School and Southport to Manchester Airport, Barton, where there is a compulsory stop of one hour. The return flight to Hooton is *via* Woodford.

The race is open to any firm, private owner or club, British nationality being the only stipulation. The Cundiff Trophy, value £125, will be held by the winner for one year. The Renolds Trophy, value £75, will be held for one year by the winning team, and the Fildes Trophy, value £35, will be similarly held for one year by the competitor who makes the fastest time. In addition there will be cash prizes of twenty guineas, ten guineas and five guineas for first, second and third place respectively.

Entry forms and further particulars may be obtained from the Secretary, Mr. D. H. Bartrum, Manchester Airport, Barton, Lancs., and intending competitors are advised to make application as soon as possible, as the entries list will be closed on August 20.

National Aviation Day Displays

DISPLAYS in connection with Sir Alan Cobham's National Aviation Day Campaign will be held as follow:—August 14, Weymouth; Chickerell Aerodrome. August 15, Teignmouth; Little Haldon Aerodrome. August 16, Wadebridge; Three Holes Cross, Camelford Road. August 17, Camelford; Davidstow, Tylands Corner; August 18, Camborne; Home Farm, Tehidy Park. August 19, Penzance; Great Rosevidney Farm, Long Rock. August 20, Plymouth; the Municipal Airport, Roborough. August 21, Okehampton; Okehampton Aerodrome. August 22, Bude; Whalesborough. August 23, Ilfracombe; West Stowford Farm, Westdown. August 24, Taunton; Musgrove Farm, Wellington Road. August 25, Weston-super-Mare; Woodspring Priory, Sand Bay. August 26, Evesham; Pershore Racecourse, Pershore. August 27, Abergavenny; Racecourse Farm, Llanfoist.



THE PAPER WEIGHT! Our photograph shows an excellent little flying model biplane constructed entirely of paper undergoing a loading test. This model, the work of Mr. W. Rigby, weighs 1¼ oz. and is supporting weights to the total of 1 lb. 3 oz.! It may be mentioned that "parts" for constructing this model were given with the issue of *Chums* for July 28 last. (FLIGHT *Photo.*)

PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda: No. 1450. *Reports and Memoranda Published between January* 1, 1931 *and April* 1, 1932. London: H.M. Stationery Office, W.C.2. Price 6*d.* net.

The Book of the Triumph. By E. T. Brown. London: Sir Isaac Pitman & Sons, Ltd. Price 2*s.* net.

The Book of the New Imperial. By F. J. Camm. London: Sir Isaac Pitman & Sons, Ltd. Price 2*s.* net.

The Model Aeroplane Manual. Edited by R. Langley. Marshall's Practical Manuals—No. 12. London: Percival Marshall & Co., Ltd. Price 1*s.* 6*d.*

NEW COMPANIES REGISTERED

AIRSCREW COMPANY, LTD. (Weybridge). INCREASE OF CAPITAL—The nominal capital has been increased by the addition of £5,000 in £1 ordinary shares beyond the registered capital of £15,000.

GORDON AVIATION TRANSPORT CO., LTD., 35, Surrey Street, Strand, W.C.2.—Capital, £500 in £1 shares. Acquiring the business of the Gordon Aviation Transport Company, carried on by F. W. Gordon Playle and P. Nutt-Smith, at 35, Surrey Street, Strand, W.C. Directors:—F. W. Gordon Playle, Westwood, Westheath Road, Bostall Health, S.E.2. G. A. Parsons, "Zomerlust," Glenthorne Gardens, Sutton, Surrey.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor (The numbers in brackets are those under which the Specification will be printed and abridged, etc.).

APPLIED FOR IN 1931

Published August 11, 1932

11,218. FIAT SOC. ANON. Aeroplanes. (376,789).
19,470. SIEMENS & HALSKE AKT.-GES. Radial cyl. i.c. engines. (376,944.)
22,269. J. DE LA CIERVA. Aircraft-sustaining rotors. (376,975.)
32,002. FIAT SOC. ANON. Mounting of i.c. engines and their accessories on aircraft. (377,060.)